Hospital Lit.

SECOND SERIES JANUARY 1944 VOL. 20, NO. 1

BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

CONTENTS

Address of Welcome 3
Arthur Freeborn Chace

Some Recent Developments in the Physiology of the Stomach and Intestine Which Pertain to the Management of Peptic Ucer 5
A. C. Ivy

Benign and Malignant Lesions of the Stomach . . . 15
Arthur W. Allen

Disorders of the Digestive System Leading to Vitamin Deficiency States in Infants and Children 29
Rustin McIntosh

The Present Status of Ulcerative Colitis and Regional Enteritis 34
J. Arnold Bargen

The Basis of a Classification of Disorders from the Psychosomatic Standpoint 46
Lawrence S. Kubie

Proceedings of Academy Meetings 66

Library Notes:

Recent Accessions 69

Deaths of Fellows 69

AUTHORS ALONE ARE RESPONSIBLE FOR OPINIONS EXPRESSED IN THEIR CONTRIBUTIONS

Published Monthly by THE NEW YORK ACADEMY OF MEDICINE
2 *East* 103 *Street, New York* 29, *N. Y.*

OFFICERS AND STAFF OF THE ACADEMY

1944

President

ARTHUR F. CHACE

Vice-Presidents

ROBERT F. LOEB — CORNELIUS P. RHOADS — J. WILLIAM HINTON

Treasurer

RODERICK V. GRACE

Recording Secretary

ROBERT E. POUND

Trustees

HARRY ARANOW — CARL EGGERS — WILLIAM S. LADD
GEORGE BAEHR — ROSS GOLDEN — HAROLD R. MIXSELL
*ARTHUR F. CHACE — MALCOLM GOODRIDGE — *ROBERT E. POUND
KIRBY DWIGHT — *RODERICK V. GRACE — CHARLES F. TENNEY
SHEPARD KRECH

Council

The President — The Vice-Presidents — The Trustees
The Treasurer — The Recording Secretary
The Chairmen of Standing Committees

Director

HERBERT B. WILCOX

Librarian

ARCHIBALD MALLOCH

Executive Secretary
Public Health Relations Committee
E. H. L. CORWIN

Executive Secretary
Committee on Medical Education
MAHLON ASHFORD

Executive Secretary, Committee on Medical Information

IAGO GALDSTON

Library Consultants

LAURA E. SMITH — B. W. WEINBERGER

Legal Counsel

JOHN W. DAVIS, ESQ.

EDITORIAL BOARD

JEROME P. WEBSTER, *Chairman*

ALFRED E. COHN — ARCHIBALD MALLOCH — PHILIP VAN INGEN
ROBERT F. LOEB — WALTER W. PALMER — KARL VOGEL

MAHLON ASHFORD, *Editor*

* Ex-officio

BULLETIN OF
THE NEW YORK ACADEMY
OF MEDICINE

JANUARY 1944

ADDRESS OF WELCOME*

ARTHUR FREEBORN CHACE

President, The New York Academy of Medicine

TONIGHT we are gathered together for the opening of the Sixteenth Annual Graduate Fortnight of The New York Academy of Medicine.

It was at the suggestion of Ludwig Kast that the Fortnight was founded and the pattern which he then outlined has been followed from the beginning. It was his idea that we should devote the entire Fortnight to the study of a single subject which would be developed by lectures, daily hospital demonstrations, exhibits, moving pictures and presentations of fresh specimens. It is a source of satisfaction to me that Dr. Kast was given credit during his lifetime for having been instrumental in establishing this annual event and that his name will always be given to the first lecture of the series.

The Fortnight has a primary educational purpose with an especial appeal to the Fellowship and to the general practitioner.

The subject of *Disorders of the Digestive Tract* was chosen for this year because of the many basic advances which have been made in this specialty since it was taken up in the Fortnight about ten years ago. It is also a most timely subject since experience has shown that in war time there is a distinct increase in disturbances of the gastrointestinal tract among both the military and the civil population. Worry,

* Delivered October 11, 1943 at the 16th Graduate Fortnight of The New York Academy of Medicine.

bad dietary habits and overwork aggravate peptic ulcer. In England it was found that perforated peptic ulcer increased by a third, and six times the usual number in areas subjected to severe air raids.

The Academy wishes to express its appreciation to Mr. R. Thornton Wilson for his great generosity in establishing the Florence Ellsworth Wilson Memorial Fund in support of the Graduate Fortnight. The income from this fund will make it possible to perpetuate the Fortnight and to maintain the high scientific standards which it has followed since its inception. It is of inestimable value in defraying the expense of bringing eminent scientists from distant places to speak to us. We are especially honored to have Mr. Wilson on the platform with us tonight so that we may endeavor to express our deep gratitude to him for his munificent gift. No more fitting tribute to the memory of a distinguished and charitable woman could have been conceived than this living memorial which will endure through the years.

In this program you see the result of almost a year's work on the part of your Fortnight Committee, for immediately upon the ending of one Fortnight, the Committee must begin preparations for another.

I hope you will find time to attend the hospital clinics, the exhibits, the evening lectures and the panel discussions.

The Committee has not only given you the opportunity to see the results of recent research in this specialty, but has also placed before you most important techniques which you will find useful in practice.

We have been greatly encouraged in studying our records of the attendance at the Graduate Fortnight, to find that year after year, not only many of the same men have returned, but also that until interrupted by the war, the attendance had steadily increased.

We feel most strongly that it is our duty to carry on all our civilian activities during the war period so that when our Fellows return from military service they will find awaiting them, in printed form, the lectures that will bring them up to date on the forward march of medicine, for the Academy must do its share in scientific advancement during the war as well as when peace returns.

In the name of The New York Academy of Medicine, I welcome you to this intellectual feast which has been prepared for you by the leading scientists and medical men in this most important specialty. We trust that you will carry away with you not only the thirst for greater knowledge but that you will continue your routine of work with renewed enthusiasm and inspiration.

SOME RECENT DEVELOPMENTS IN THE PHYSIOLOGY OF THE STOMACH AND INTESTINE WHICH PERTAIN TO THE MANAGEMENT OF PEPTIC ULCER*

A. C. IVY

Nathan Smith Davis Professor of Physiology, Northwestern University.

I CONSIDER it a distinct honor to have been invited to deliver this lecture in memory of Doctor Ludwig Kast, who manifested his devotion to the Profession of Medicine in many ways, only two of which I shall mention. One was to propose this Graduate Fortnight, which is well known and highly regarded throughout our Country. The other was the service he rendered to the advancement of Medical Science by his perspicacious administration as President of the Josiah Macy, Jr. Foundation.

It is appropriate on this occasion to present, first, a development in which Dr. Kast manifested much interest and which he facilitated in his capacity as President of the Foundation. *This development pertains to the possibility that a patient may be "immunized" against the recurrence of peptic ulcer by the intramuscular injection of an extract of duodenal mucosa containing enterogastrone.*

ENTEROGASTRONE

It has been well established that fat and sugar acting in the intestine in an adequate concentration inhibit gastric secretion and motility by the production of a chalone called enterogastrone.[1,2,3] Extracts of the upper intestinal mucosa have been prepared, which when injected parenterally, inhibit gastric motility and gastric secretion, regardless of the type of stimulus.

It has been postulated that since fat in the intestine and relatively crude extracts (pyrogen free) of intestinal mucosa inhibit both gastric secretion and motility, that only one active principle, namely, enterogastrone is concerned. The results of recent experiments in our labora-

* The Ludwig Kast Lecture, given October 11, 1943 at the Sixteenth Graduate Fortnight of The New York Academy of Medicine.

tory show that preparations (pyrogen free) can be made which inhibit gastric secretion without inhibiting motility in the doses used.[4] In fact, the preparation which we have been and are using in patients with peptic ulcer and in preventing ulcers in animals does not inhibit motility in the dose employed. Thus, it is becoming more evident that the principle which is responsible for inhibiting gastric secretion is different from that which inhibits gastric motility.

It was discovered in different laboratories that the urine of man and dog contains substances which inhibit gastric secretion and motility. This suggested the hypothesis that the urinary substances represent excreted enterogastrone.[5,6,7]

Urogastrone

Because it was uncertain whether the urinary gastric inhibitors were identical with duodenal gastric inhibitors, the former were termed *urogastrone* to distinguish them from enterogastrone.

It is clear that the feeding of a high or low fat diet increases the amount of urogastrone in human and canine urine.[8] In addition there is evidence which indicates that the patient with peptic ulcer excretes less urogastrone than non-peptic-ulcer subjects. In 8 patients with peptic ulcer on a milk and cream diet less urogastrone was excreted even than by fasting normal men.[8] (In such experiments it is necessary to collect the urine fresh and to avoid bacterial action, otherwise much pyrogen is formed. In our experiments additional precautions are taken to remove pyrogen, and rectal temperatures are taken to make certain that pyrogen is not present.)

A serious attempt was made to ascertain whether urogastrone was produced by the intestine. A number of animals were enterectomized. In such animals the excretion of gastric inhibitory substances from the urine was regularly reduced but not abolished. When a "control operation" was performed, the excretion was increased. This latter observation rendered the interpretation of the results obscure. More than one gastric inhibitory substance may exist in the urine, some being specific and others non-specific in nature.

Steps to concentrate "one" of the gastric inhibitors in the urine have met with considerable success. Five-tenths of a milligram of the best preparation represents a gastric secretory inhibitory unit.[9] This particular urogastrone has properties which differ from those of entero-

gastrone. One of the differences is that pepsin has no effect on this urogastrone while it inactivates enterogastrone. This shows that there is a urogastrone in human and canine urine which is not identical with enterogastrone. The source of this urogastrone is uncertain; it may even be a metabolic product of enterogastrone.

It has been clearly shown that the subcutaneous administration of urogastrone inhibits gastric secretion in man in doses which do not affect body temperature or cause immediate side reactions.[10] This preparation was not used clinically in peptic ulcer patients because it caused a local swelling about the site of injection which appeared several hours later. However, we have been able to prepare a concentrate of enterogastrone which does not irritate the tissues locally and which we have injected intravenously and intramuscularly in numerous human and canine subjects.[11]

The "Immunization" of Dogs Against Gastrojejunal Ulcer

To determine whether our enterogastrone would prevent the development of gastrojejunal ulcer, we used the Mann-Williamson (M-W) preparation. This preparation consists of a gastrojejunostomy in which the alkaline bile and pancreatic juice is diverted to the last 15 cm. of the ileum.

The prevention of ulcer: In Table I it will be noted (a) that when the animals are not treated 98 per cent die with ulcer in from 1 to 9 months; (b) that 10 dogs which were injected with an extract of muscle, treated as for the preparation of enterogastrone, all died of ulcer in 1 to 7.5 months; and (c) that of 33 dogs which received our enterogastrone preparation intravenously or subcutaneously only 25 per cent developed ulcer.

The fact that 25 per cent developed ulcer we cannot explain adequately. Either they became refractory to the material or the dose was not sufficiently large. It is interesting, however, that we have found in the course of our assays of enterogastrone that 25 per cent of dogs become refractory.[11]

"Immunization" against ulcer: After preventing ulcer in the dogs for one year, the treatment was stopped with the idea that an ulcer would occur and then we could ascertain the "healing properties" of the treatment. *To our surprise*, ulcer did not occur in 11 dogs during

TABLE I

RESULTS OF THERAPY WITH ENTEROGASTRONE INTRAVENOUSLY AND SUBCUTANEOUSLY

Group	*No. of Dogs*	*Average Longevity Months*	*Range of Longevity Months*	*Per Cent Developing Ulcer*
Dietary Control	112	3.8	1—9	98.2
Muscle Extract Control	10	3.9	1—7.5	100
Enterogastrone Treated Intravenously	25			
6—developing ulcer while on treatment		6.7	4.2—9.2	25
8—dead of causes other than ulcer		4.7	1.5—9	
11—alive at 1 yr. without ulcer, proven by exploratory.				
Treatment of the 11 dogs was stopped after 1 yr.				
7 of 11 are now alive 17 to 24 months after cessation of treatment without ulcer.				
3 of 11 died from causes other than ulcer in from 11 to 12.5 months after cessation of treatment.				
1 of 11 died with ulcer 18.0 months after cessation of treatment.				
Enterogastrone Treated Subcutaneously	8			
2—developed ulcer		4—4.5		25
6—are alive without ulcer for 1 yr. and off of treatment for 2.5 months without ulcer.				

one year without treatment. This surprised us because in previous work it was found that when ulcer was prevented with aluminum phosphate or gastric mucin, an ulcer developed in from 1 to 4 months, or an average of about 2 months after cessation of the treatment. But with enterogastrone 7 of the 11 animals are still alive without ulcer from 1.5 to 2 years after cessation of treatment, and only one of the 11 animals died of ulcer after the cessation of treatment.

TABLE II

THE EFFECT OF ENTEROGASTRONE AND OLIVE OIL ON PEPSIN SECRETION

Procedure	*Volume cc.*			*Free Acid Total Output mgm.*			*Pepsin Concentration M.U./cc.*			*Pepsin Total Output M.U.*		
	C	E	%	C	E	%	C	E	%	C	E	%
Denervated Pouch Pilocarpine and Enterogastrone ...	23.0	11.1	—52	59.2	9.3	—84	964	1269	+32	25M	14M	—42
Innervated Pouch Pilocarpine and Enterogastrone ...	12.9	5.5	—57	27.7	6.2	—78	1160	1400	+21	14M	7M	—48
Denervated Pouch Pilocarpine and Olive Oil	42.1	28.0	—33	129	64	—50	940	936	0	32M	25M	—22
Innervated Pouch Pilocarpine and Olive Oil	8.7	3.6	—59	12.2	0.2	—98	1450	550	—62	12M	2M	—84

MECHANISM OF THE "IMMUNIZATION"

Acid Production: Gastric analysis was performed on a group of untreated control as well as the treated animals. The treated animals manifested less tendency toward a prolonged secretory response to a meal. The differences however were not statistically significant. When an alcohol test meal was used it produced an abnormally prolonged secretory response in the treated animals as well as in the controls (M. I. Grossman). Thus, the evidence failed to show that the enterogastrone had effected an "immunization" by depressing gastric secretion.

Pepsin Production: The data in Table II (M. I. Grossman and H. Greengard) show that enterogastrone decreases total pepsin output, but does not abolish it. Ample pepsin remains to carry on normal gastric digestion. Further, it has been found (M. I. Grossman) that our "immunized" dogs secreted normal amounts of pepsin in response to an alcohol test meal.

Comment: Thus, we do not possess a proven explanation for the nature of the "immunization."

It is reasonable to hypothesize that the injections have increased the resistance of the jejunal mucosa to ulceration. It has been clearly established that the corrosive action of unbuffered gastric juice is the chief cause of jejunal ulcer in M-W dogs. The nutritional disturbance incident to the operative interference with normal digestion is another factor. And, a third factor is that the jejunum is more sensitive to the irritating action of gastric juice than the duodenum.

It should be recalled that Sandweiss, Saltzstein and Farbman[12] have observed that ulcer can be prevented in M-W dogs by the injection of a urine extract. The results of their studies indicated that the substance acted not by depressing gastric secretion but by promoting repair of the mucosa. More recently Sandweiss[13] has reported that the administration of his urinary product to M-W dogs also confers an "immunity" against recurrences.

The Use of an Enterogastrone Preparation in Man

To date we have administered our enterogastrone preparation to some 15 patients, who have given a history of 2 or more recurrences of peptic ulcer annually. Palliative results have been obtained. However, sufficient time has not elapsed to determine whether any "immunization" has occurred. Considerable time and statistical data will be required to ascertain whether the human patient will react similarly to the dog.

Our animal experiments, at least, have provided a basis for the hope that in time we may be able to "immunize" patients against repeated recurrences of peptic ulcer.

The Response of the Human Stomach to Caffeine and Coffee

Many physicians in the management of patients with peptic ulcer interdict the use of alcoholic beverages and smoking. Very few interdict the use of coffee.

Alcohol: It is well established that alcohol in concentrations of less than 20 per cent stimulates gastric secretion. In fact, alcohol stimulates gastric secretion when administered by any route. There is good evidence to show that alcohol stimulates, even when given intravenously, by causing the release of histamine from tissues.[14, 15] Since it is certain that high acidity and irritants contribute to the chronicity of peptic ulcer, it is rational to interdict alcohol.

Smoking: It is uncertain why so many ulcer patients improve after giving up smoking. Smoking increases the acidity of the gastric contents in some subjects when the alcohol test meal is used,[16] though we have never seen it stimulate gastric secretion materially in the fasting stomach.[17] Smoking inhibits gastric motility, and by inducing retention smoking may increase the acidity of the gastric contents. As a result of our studies[17] on the effect of smoking on the gastrointestinal tract, in which we observed depression of gastric activities in all but 2 of 60 subjects, we suggested that the deleterious effects of smoking on the stomach may be secondary to cardiovascular changes. We observed the greater changes when the subject reached or strained his tolerance. It is of interest in this connection that Wolf and Wolff,[18] observed marked pallor of the gastric mucosa and depression of motility and acid secretion when their "Alexis St. Martin" strained his tolerance for tobacco.

Caffeine: There are some 30 articles in the literature dealing with the effect of coffee and caffeine on the stomach. Most of the articles because of defective technique or because they used the dog as an experimental animal conclude that coffee and caffeine are without effect on gastric secretion. Some authors, however, have suggested the use of coffee as a test meal, and tea and toast has been used extensively as a test meal.

My attention was first attracted to caffeine when a physician reported to me a patient who apparently developed ulcer on consuming daily some 20 bottles of a beverage containing caffeine. I informed him that I had on several occasions administered caffeine to dogs without observing a stimulation of gastric secretion. Dr. J. A. Roth and I decided to study the subject when Dr. Owen Wangensteen told me that E. S. Judd[19] had produced duodenal and gastric ulcers in cats and guinea pigs by administering caffeine in bees' wax subcutaneously.

The production of ulcer in cats with caffeine. We have confirmed the observations of Judd.[19] Acute and chronic ulcers of the stomach and duodenum can be produced in cats by the administration of 5 grains of caffeine daily. In fact, in some cats the intravenous administration of a single dose of 2 grains of caffeine will cause within a few hours hemorrhagic erosions, acute ulcers and areas of marked vasoconstrictor spasm in the gastric mucosa.

The latter dose on a body weight basis would amount to 30 to 60

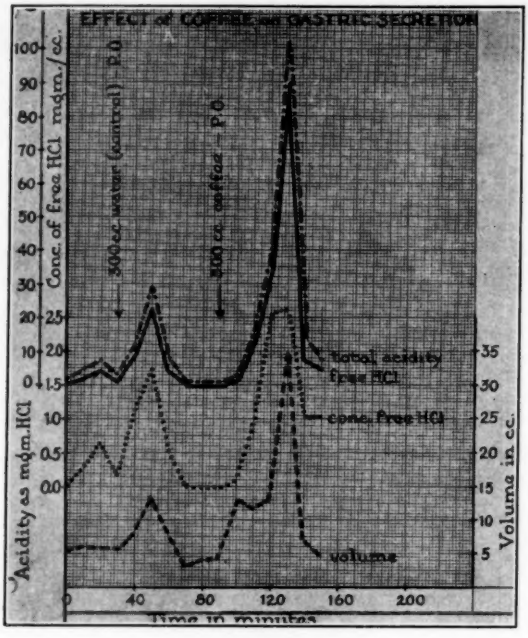


Fig. 1

grains of caffeine daily in man. Thus, if the human stomach responds like the cat's stomach, *the abuse* of coffee or beverages containing caffeine may be a direct cause of ulcer in susceptible patients.

The Stimulation of Gastric Secretion by Caffeine, Coffee and Sanka:

Dog. As others have found, ordinary doses of caffeine do not stimulate gastric secretion in the Heidenhain or Pavlov pouch dogs.

Cat. One grain of caffeine administered intravenously or intramuscularly to cats stimulates a flow of gastric juice of high acidity. This effect is decisively inhibited by atropine.

Man. Dr. Roth's observations on man may be summarized as follows:

The intramuscular injection of 4 grains of caffeine base, as caffeine sodium benzoate, causes a copious secretion of gastric juice. The response is usually completed in 1 hour though some subjects secrete at a high level for 2 or 3 hours. *The oral administration of the same dose* in 200 c.c. of water stimulates to about the same extent, and *1 mg. of atropine sulphate* subcutaneously decidedly reduces but does not abolish

the response. A dose as small as 1.2 grains of caffeine orally in 200 cc. of water definitely stimulates.

300 cc. of coffee (Figure 1) given via the stomach tube, to avoid psychic stimulation, decidedly stimulates gastric secretion. In some subjects the response is completed in 1 hour, in others the response continues for 2 or 3 hours. 300 c.c. of "Sanka," which contains somewhat more than 1.0 grain of caffeine also stimulates gastric secretion.

50 cc. of 7 per cent alcohol and 4 grains of caffeine manifest a synergistic stimulation of gastric secretion. Thus, *the practice of drinking coffee in relation to alcoholic beverages places the stomach and duodenum of the person susceptible to peptic ulcer under considerable strain.*

We were particularly interested in ascertaining whether caffeine and histamine acted synergistically on the gastric glands. This is because it is strongly presumptive that that portion of the gastric secretory response in the ulcer patient which is not abolished by atropine is due to histamine. *Our results on normal subjects show that histamine and caffeine act synergistically in stimulating the gastric glands.* For this reason, I suspect that when we study the response of patients with peptic ulcer to caffeine and coffee, a very low threshold to caffeine stimulation will be found.

Summary

1. The results of experiments on animals provide a basis for the hope that in time we may be able to increase the resistance of the gastric and duodenal mucosa to ulceration and decrease the incidence of recurrences of peptic ulcer in susceptible patients.

2. There is substantial laboratory evidence supporting the view that the consumption of alcoholic beverages, excessive smoking and the excessive use of coffee so affect the gastric mucosa and glands as to predispose to gastroduodenal ulceration in susceptible subjects.

REFERENCES

1. Farrell, J. I. and Ivy, A. C. Studies on the motility of the transplanted gastric pouch, *Am. J. Physiol.*, 1926, *76*:227.
2. Feng, T. P., Hou, H. C. and Lim, R. K. S. Mechanism of inhibition of gastric secretion by fat, *Chinese J. Physiol.*, 1929, *3*:371.
3. Quigley, J. P., Zettelman, H. J. and Ivy, A. C. Analysis of factors involved in gastric motor inhibition by fats, *Am. J. Physiol.*, 1934, *108*:643.
4. Harris, S. A. *To be published.* Greengard, H. and Grossman, M. L. *To be published.*

5. Gray, J. S., Wieczorowski, E. and Ivy, A. C. Inhibition of gastric secretion by extracts of normal male urine, *Science*, 1939, *89:*489.
Culmer, C. U., Atkinson, A. J. and Ivy, A. C. Depression of gastric secretion by anterior pituitary-like fraction of pregnancy urine, *Endocrinology*, 1939, *24:*631.
6. Friedman, M. H. F., Recknagel, R. O., Sandweiss, D. J. and Patterson, T. L. Inhibitory effect of urine extracts on gastric secretion, *Proc. Soc. Exper. Biol. & Med.*, 1939, *41:*509.
7. Necheles, H., Hanke, M. E. and Fantl, E. Preparation and assay of inhibitor of gastric secretion and motility from normal human urine, *Proc. Soc. Exper. Biol. & Med.*, 1939, *42:*618.
8. Gray, J. S., Culmer, C. U., Wells, J. A. and Wieczorowski, E. Factors influencing excretion of urogastrone, *Am. J. Physiol.*, 1941, *134:*623.
9. Gray, J. S., Wieczorowski, E., Wells, J. A. and Harris, S. C. Preparation and properties of urogastrone, *Endocrinology*, 1942, *30:*129.
10. Gray, J. S. Present status of urogastrone, *Am. J. Digest. Dis.*, 1941, *8:*365.
11. Hands, A. P., Greengard, H., Preston, F. W., Pauley, G. B. and Ivy, A. C. Prevention of experimental gastrojejunal ulcer by enterogastrone therapy, *Endocrinology*, 1942, *30:*905.
12. Sandweiss, D. J., Saltzstein, N. C. and Farbman, A. A. Relation of sex hormones to peptic ulcer, *Am. J. Digest. Dis.*, 1939, *6:*6.
13. Sandweiss, D. J. The immunizing effect of the anti-ulcer factor in normal human urine (anthelone) against the experimental gastrojejunal (peptic ulcer in dogs, *Gastroenterology*, 1943, *1:*965.
14. Dragstedt, C. A., Gray, J. S., Lawton, A. H. and Ramirez de Arellano, M. Does alcohol stimulate gastric secretion by liberating histamine, *Proc. Soc. Exper. Biol. & Med.*, 1940, *43:*26.
15. Gregory, R. A. and Ivy, A. C. Humoral stimulation of gastric secretion, *Quart. J. Exper. Physiol.*, 1941, *31:*111.
16. Ehrenfeld, I. and Sturtevant, M. Effect of smoking tobacco on gastric acidity, *Am. J. M. Sc.*, 1941, *201:*81.
17. Schnedorf, J. G. and Ivy, A. C. Effect of tobacco smoking on alimentary tract; experimental study of man and animals, *J.A.M.A.*, 1939, *112:*898.
18. Wolf, S. and Wolff, H. G. *Human gastric function.* New York, Oxford Univ. Press, 1943.
19. Judd, E. S., Jr. Experimental production of peptic ulcers with caffein, *Bull. Am. Coll. Surgeons*, 1943, *28:*46.

BENIGN AND MALIGNANT LESIONS OF THE STOMACH*

ARTHUR W. ALLEN

Chief, East Surgical Service, Massachusetts General Hospital
Lecturer in Surgery, Harvard Medical School

THE differential diagnosis between benign and malignant lesions of the stomach is often impossible by any of the clinical diagnostic methods known. The physician, the roentgenologist, the gastroscopist, and the surgeon may be in doubt or completely wrong concerning the true nature of the disease until the pathologist has examined the specimen microscopically. Since there is ample opportunity to treat a malignant lesion under the impression that it is benign, we must weigh the evidence carefully in each case. All doubtful ulcerations and tumors should be widely resected, since by this method alone can we give the patient, in the early stages of cancer, his greatest chance for cure. The added procedure, under these circumstances, rarely jeopardizes the outcome, if the microscopic studies finally prove the non-malignant nature of the pathological process. On the other hand, the radical attack will materially increase the number of cures in this group of patients.

BENIGN LESIONS

Benign lesions of the stomach include simple ulcer, anastomotic ulcer, gastrojejunocolic fistula, leiomyoma, gastritis, polyposis, and syphilis. Those considered malignant at any stage are carcinoma, sarcoma, and lymphoma. That some of the disorders in the benign group may become malignant has been established. Often, it has been said that benign ulcer may undergo malignant degeneration. This is probably true in a small percentage of such lesions, since one does occasionally find cancer cells on the edge or one side of benign ulcer. The leiomyomatous tumors may be entirely benign but often are found to be sarcomatous. Whether these processes are always benign at some early stage of their development is difficult to establish. It is probably true that adenomatous polyps begin as a benign process but in ulcer

* Read October 12, 1943 at the Sixteenth Graduate Fortnight of The New York Academy of Medicine.

and the leiomyomatous lesions, they are probably either benign or malignant from their beginning. The speed with which tumors of the stomach develop, varies tremendously. A fulminating inoperable cancer may be encountered in a person enjoying perfect health until a few days before seeking medical advice. On the other hand, one finds a good story with all evidence that years have passed before a malignant lesion has produced sufficient invalidism to excite the suspicion of the victim or the clinician. The fact that cancer of the stomach accounts for more deaths than any other malignant lesion in this country, should certainly be sufficient reason to warrant the possibility of this diagnosis with greater frequency in the borderline and early stage cases.

Polyps of the stomach may cause little in the way of symptoms other than anemia. Severe blood loss does occur and usually this is gradual and insidious. A condition resulting from polyposis, difficult to differentiate from pernicious anemia, is occasionally seen. Acute sudden hemorrhage of massive degree occurs rarely.[1] If the polyp occurs in the antrum and is attached by a long stalk, symptoms of intermittent pyloric obstruction are the rule. Achlorhydria is present in nearly all cases. In a study of the cases of polyposis of the stomach occurring in the Massachusetts General Hospital, we found that malignant degeneration had occurred in 41 per cent of the cases.[2] Pearl and Brunn have recently reported a new collected series in which 50 per cent had become malignant.[3] They state that two types of polyps occur—those of congenital or neoplastic origin, and those that are secondary to an inflammatory process. It is obvious, if the polyps are few and pedunculated, that they may be removed by gastrostomy. If they are numerous or sessile in type, that portion of the stomach involved must be resected.

Leiomyoma is a rare tumor of the stomach, occurring in 1 per cent of our cases of hemorrhage from the upper gastrointestinal tract. They are sometimes recognized in routine gastrointestinal examinations before symptoms of this lesion occur. More often, however, the diagnosis is made following a severe massive hemorrhage. Usually such patients are suspected of having cancer of the stomach from the lack of digestive disturbances, the onset of sudden bleeding, and the tumefaction seen in the roentgenograms. Actually, the appearance in the films and the gastroscope are characteristic. The smooth rounded tumor with an umbilicated center cannot easily be mistaken for any other

lesion. The hemorrhagic tendency is easily explained when one investigates the central depression, since this will be found to lead to a blood vessel in the stomach wall. The most usual location is the lesser curvature and the bleeding vessel, a branch of the left gastric artery. Many of these are of neurogenic origin as pointed out by Ransom and Kay in a review of the pathology of such lesions appearing in their clinic.[4] Many of them are benign and if one could be sure of this, a simple excision of the tumor would suffice. On the other hand, we find that the appearance of the tumor is not always a reliable guide and some that appear benign turn out to be sarcomatous. It is probably safe to locally excise the small symptomless tumors, particularly, if they occur near the cardia and are inaccessible. The rule for those appearing in the more accessible regions and those of sufficient size to have caused severe bleeding, as well as those with obvious extension through the serosa, should be wide resection.

Gastritis is now recognized with greater frequency since the roentgenologist has learned its characteristic picture and the gastroscopist has become an important member of our diagnostic group.[5] That severe and even fatal hemorrhage can result from gastritis, we have long been aware. It is necessary to place this malady in its proper sphere and not assume that it is to be expected only as an accompanying lesion to ulcer of the stomach and duodenum. It is usually precipitated by the ingestion of irritating foods, condiments, and alcohol. Occasionally, one meets this situation in an individual of exemplary habits of diet, etc., only to find that stress and strain of an emotional type may be the only activating factor. High acid levels in the gastric contents are the rule. In the usual case not associated with other complications, one finds a gratifying response to proper palliative treatment, consisting of a bland smooth diet, bed rest, and the elimination of psychic disturbances. Often, it is necessary to begin treatment by complete physiological rest of the gastrointestinal tract, until the acute phase has subsided. Blood transfusions, intravenous fluids, salt, glucose, vitamins, and amino acids are often helpful.

Severe gastritis, producing repeated severe hemorrhages and almost complete invalidism, has occurred in two patients in our clinic following the Billroth II type operation for duodenal ulcer. These patients had had the pylorus and first portion of the duodenum removed, the antrum closed, and a posterior gastrojejunostomy done. Finally, radical

operation was undertaken and both have been completely relieved by a subtotal gastrectomy, which included the old anastomosis. In neither of these patients was there any evidence of duodenal or anastomotic ulcer at the time of the last operation. Both had an extremely virulent type of hypertrophic gastritis. In no case in my experience has it been necessary to subject a patient with uncomplicated gastritis to surgery, although in a few instances of stubborn resistance to palliative management, it has been considered.

Syphilis of the stomach, producing disabling symptoms, is met rarely in our clinic. Usually the diagnosis has been mistaken for carcinoma and the operation undertaken because of the lack of response to antiluetic treatment. It must be remembered that a positive serological test is no indication that a lesion of the stomach resembling cancer is syphilis. Williams and Kimmelstiel[6] have brought out some of the more logical points of differential diagnosis. Patients have withstood radical operation for this lesion well and should be offered the benefit of surgery in all doubtful cases.

Anastomotic ulcer and *gastrojejunocolic fistula* are complications of inadequate surgery for duodenal ulcer. Although these lesions demand radical procedures involving the stomach, they are not primarily of stomach origin and will not be further considered in this discussion.

Gastric ulcer is by far the most common benign lesion in the stomach. It is much less frequent than duodenal ulcer, and our conception of its management has been materially influenced by a greater experience with the duodenal lesion. The term "peptic ulcer," so long in use, has confused the issue to some extent. Since duodenal ulcer responds so well to palliative methods, in the majority of cases, it has led us to a dangerous and careless attitude regarding gastric ulcer. In a series of 255 cases diagnosed and treated as benign gastric ulcer in our clinic, we found that 14 per cent of them finally proved to have cancer.[7] It was obvious to us that the differential diagnosis was often impossible until the microscopic sections were studied. We analyzed the records of this group of patients carefully to determine findings that might lead to a more accurate diagnosis.

Healing of the ulcer area, under ideal hospital treatment, was of disappointing value in this group. Patients with proven cancer often lost their symptoms, regained lost weight, and by roentgenographic and

gastroscopic studies appeared to have healed their ulcerations. This, we believe, may be explained by the subsidence of the surrounding inflammatory reaction and by the temporary filling in of the crater by cancer cells or granulation tissue. Since we know that this false impression can occur, it becomes all the more necessary to keep a careful watch of these patients and see that they return for observation within a month of discharge from the hospital.

The persistence, type, and radiation of *pain* in gastric ulcerations was also of little help in the diagnosis. Some patients with symptoms, controlled only on hospital management, finally proved to have cancer. On the other hand, lesions that failed to respond to the best palliative regimen that could be outlined for them, finally showed no evidence of malignancy by microscopic studies.

The *location* of the ulcer was of considerable help. Sixty-five per cent of the ulcers in the immediate prepyloric region and 90 per cent of those on the greater curvature proved to be malignant, while 20 per cent of those involving either the anterior or posterior walls and 10 per cent of those of the lesser curvature, proved to be cancer. These data are somewhat misleading since half of all the ulcerations of the stomach coming to our clinic were located on the lesser curvature. In this most common site, we found the majority of our errors in diagnosis.

The *size* of the ulcer gave some indication of its true nature. The average diameter of those proved benign was 1.7 cm., while the malignant group averaged 2.3 cm. Two ulcers in the prepyloric region, less than 1 cm. in diameter, were malignant. One enormous lesion, requiring total gastrectomy under the diagnosis of unfavorable cancer, proved to be benign ulcer. Therefore, it is impossible to rely on the size of the ulcer as an infallible guide. In the majority of cases, however, the small ulcer will prove to be benign while the large lesion will be malignant.

Free *acidity* of the stomach contents in proven cancer in our hospital was absent in 60 per cent of the cases. In the "ulcer-cancer" group, free acid was found in those proving to be cancer in the same high proportion as was observed in benign ulcer. Therefore, we may expect malignancy in the achlorhydriac stomach but cannot depend on the finding of acid in the stomach contents to rule out cancer.

The *age* of the patient and the *duration* of symptoms were evalu-

ated in respect to differential diagnosis with considerable helpful evidence. In patients beyond the age of fifty with symptoms of less than one year, the lesion proved to be cancer five times as often as benign ulcer. If, on the other hand, symptoms had been present for over five years, the reverse was true in this same age-group. In the younger patients, the duration of symptoms did not help in the differential diagnosis. It has long been known that indigestion associated with gastric ulceration, beginning after the age of forty, is very likely to prove to be due to cancer.[8]

Medical management of benign gastric ulcer is not as effective as it is in duodenal ulcer. In a recent study by Judd and Priestley,[9] they found that less than 50 per cent of patients with gastric ulcer were satisfactorily maintained on a medical regimen. In their group, 10 per cent of gastric ulcerations finally proved to be due to cancer. Surgical treatment gave satisfactory results in all but 1 of 162 patients who survived operation.

We have been impressed by the safety of gastrectomy for gastric ulcer as compared to the same type of operation for duodenal ulcer. In 65 consecutive operations for gastric ulcer in our clinic, there was only 1 death. This is due to the lack of difficulty in management of the duodenal stump when it is normal and free. When duodenal ulcer with its inflammatory extension is dealt with, there is in many instances the problem of a satisfactory turn-in of normal duodenum.

In our group, the five-year cure-rate was raised to 40 per cent when the operation was undertaken on the diagnosis of ulcer and cancer was found microscopically. This is double the percentage of five-year cures observed in our clinic when the operation was carried out on the clinical diagnosis of cancer.[10]

When one considers the difficulty in differential diagnosis, the relatively unsatisfactory results of medical treatment, the increased safety of radical surgery, and the marked improvement in end-results in these with early cancer, we have a strong argument in favor of considering gastric ulcer as primarily a surgical lesion.

Malignant Lesions of the Stomach

Lymphoma produces a tender, often palpable, lesion of the stomach. This lesion rarely comes to the surgeon at an operable stage; usually there is associated extensive lymph node involvement. The diagnosis

is usually confirmed by biopsy. Fortunately, these lesions are radiosensitive to a surprising degree. Long respites and possible cures have been reported. Recurrences of the disease and widespread metastases respond less well to therapy. When possible, a combination of surgery and radiation gives the best results.[11]

Sarcoma of the stomach occurs with slightly greater frequency than lymphoma and both lesions are comparatively rare. In reticulum cell sarcoma, there is evidence that postoperative radiation is of value.[12] In some of the other forms of sarcoma, radiation seems to have less to offer. In all cases, wide resection with involved nodes should be done when possible and all should have the benefit of postoperative roentgen radiation.

Cancer of the Stomach occurs with such frequency that one should exert every effort towards the education of the laity regarding this possibility. The people should know that approximately 35,000 deaths occur each year in this country from this cause.[13] So far, the only effective attack on the disease is by surgical extirpation. The earlier the lesion at the time of operation, the better the prognosis. Advertising of indigestion cures should be prohibited by legislation.

The physician has the responsibility of thorough investigation of patients with symptoms and signs of early cancer of the stomach. Indigestion beginning after the age of forty, anemia, anorexia, fatigability, and weight-loss should lead to a careful consideration of the stomach. Too often, investigation has been postponed until the patient is beyond the help of surgery. By a careful evaluation of the situation, many early and curable lesions can be recognized.

The surgeon has gradually increased the operability rate of carcinoma of the stomach in accord with the developments in preparation, anesthesia, technique, and after-care. In a report by Parsons,[14] from our clinic in 1933 and a later one in 1939[10] on the curability of cancer of the stomach, we find the resectability increased from 27 to 37 per cent and the operative mortality reduced from 38 to 25 per cent. In these comparative groups, there was 20 per cent of five-year cures in the first series as compared to 21 per cent in the later. These figures include the operative mortality. Although it was disappointing to find no appreciable increase in the five-year cures, it was evident that a greater number of patients had more months of respite in the latter group than the former. In other words, we have been more bold in our attempts

than our predecessors and have actually accomplished more difficult and more extensive resections with a lower mortality rate, still we have no greater percentage of patients living over five years. The questions naturally arise: Is the effort expended justifiable and how can we obtain better results?

In the past eight years, more than 100 patients have been subjected to total gastrectomy for cancer by members of our staff. This includes several operations accomplished through the chest by members of the thoracic service. That immediate results have been poor and that respites in the survivors have often been of short duration, we admit. On the other hand, one patient is alive and apparently free of disease seven years after operation, and numerous others are still alive for shorter periods or have had respites of from one to nearly five years. Actually, in some of the most apparently unfavorable cases, there have been the best results. Although one may question the judgment in the selection of these cases and in the effort expended, we feel that there is no reason to lower our standards of perseverance in this otherwise hopeless group of individuals.

There is much to be said regarding the type of operation that must be considered in the more favorable group of patients. Ogilvie[8] has pointed out that the nodal distribution in cancer of the stomach runs true to a pattern. One should include in the resection the great omentum, all the nodal area about the pylorus, and the cardia. This operation must be looked upon like radical operation for cancer of the breast or colon where it is clearly demonstrated that concomitant dissection of the available lymphatic extension increases the number of cures. Actually, the inclusion of these lymphatic areas contiguous with the stomach creates no problem if one takes it into consideration from the beginning of the operation. It is my belief that these areas should be included in the early cases of doubtful malignancy. By this means, we may materially increase the number of cures. If there is extension by contact to many structures, the outlook is poor; yet one can often include the spleen, transverse colon, a part of the pancreas, and even a segment of the liver in a justifiable attempt to remove all obvious disease. The thoracic surgeon has the best approach to those lesions involving the lower end of the esophagus and the lymph nodes in this region.

It is my opinion that the extent of operation should be increased rather than decreased. We have had the opportunity of removing the

proximal segment of the stomach for recurrence of disease following a subtotal resection done three years previously. The second operation gave a respite with comfort and ability to work for over a year. Could a cure have been obtained if a more extensive procedure had been done in the first place? There are types of cancer of the stomach that extend along the stomach wall in an insidious manner, so that often one is aware of cutting through probable extension at the time of subtotal gastrectomy. It is likely that I will be quoted as advocating total gastrectomy for cancer in all cases. This is not true, since I am sure that many of them can be resected without having any recurrence in the stomach segment. On the other hand, I think we should consider the added chance of eradicating all disease by total gastrectomy whenever we feel that the chance of cure can be justifiably increased thereby.

In total gastrectomy, one should expose an adequate 5 to 8 cm. of lower esophagus. This is always possible by dividing the vagus nerves. We have found that fixation of the jejunal loop to the diaphragm is of great aid in the anastomosis.[15] We have adopted, with gratitude, the modification of anastomosis advocated by Graham[16] which implants the esophagus into the anterior wall of the distal jejunal loop, and encloses this area by using the proximal loop of jejunum over it. This technique simplifies the operation tremendously and has entirely eliminated the problem of leakage at the anastomosis. We have had better results with bringing the jejunal loop through the transverse mesocolon. We have always made a large entero-enterostomy between these loops of jejunum. Recently, we have eliminated the need of the Levine tube postoperatively by placing a catheter in the jejunum for drainage of the salivary, biliary, and pancreatic secretions.[17] A jejunostomy for feeding has always been used in our cases.

Summary and Conclusions

1. Benign and malignant lesions of the stomach are not always distinguishable.
2. Polyposis is probably always benign originally but malignant degeneration occurred in 41 per cent of our cases.
3. Leiomyomata may be locally excised only when small and in inaccessible regions of the stomach.
4. Ulcer of the stomach could not be distinguished from cancer in a number of our patients studied. The over-all diagnostic per-

centage error was 14.

5. Short duration of symptoms in the older age group and lesions located in the prepyloric and fundal areas were more often found to be malignant than benign.
6. Medical treatment of gastric ulcer is less effective than conservative measures for duodenal ulcer.
7. Radical surgery is less dangerous in gastric ulcer than the same type of operation for duodenal ulcer.
8. Cancer of the stomach is more curable in the early stages of the disease.
9. Operation should be done in all doubtful lesions of the stomach.
10. Attention must be given to a careful inclusion of the lymphatic spread in the operative attempts to cure cancer of the stomach.

REFERENCES

1. Allen, A. W. Acute massive hemorrhage from the upper gastro-intestinal tract, *Surgery*, 1937, *2*:713.
2. Benedict, E. B. and Allen, A. W. Adenomatous polypi of the stomach, with special reference to malignant degeneration, *Surg., Gynec. & Obst.*, 1934, *58*: 79.
3. Pearl, F. L. and Brunn, H. Multiple gastric polyposis, a supplementary report of 41 cases, including 3 new personal cases, *Surg., Gynec. & Obst.*, 1943, *76*:257.
4. Ransom, H. K. and Kay, E. B. Abdominal neoplasms of neurogenic origin, *Ann. Surg.*, 1940, *112*:700.
5. Benedict, E. B. Hemorrhage from gastritis—gastroscopic study, *Am. J. Digest. Dis. & Nutrition*, 1937, *4*:657.
6. Williams, C. and Kimmelstiel, P. Syphilis of the stomach, *J.A.M.A.*, 1940, *115*:578.
7. Allen, A. W. and Welch, C. E. Gastric ulcer; the significance of this diagnosis and its relationship to cancer, *Ann. Surg.*, 1941, *114*:498.
8. Ogilvie, W. H. Cancer of the stomach, *Surg., Gynec. & Obst.*, 1939, *68*:295.
9. Judd, E. S. and Priestley, J. T. Treatment of gastric ulcer, *Surg., Gynec. & Obst.*, 1943, *77*:21.
10. Parsons, L. and Welch, C. E. The curability of carcinoma of the stomach, *Surgery*, 1939, *6*:327.
11. Stout, A. P. Is lymphosarcoma curable? *J.A.M.A.*, 1942, *118*:968.
12. Schroeder, G. F. and Schattenberg, H. J. Sarcoma of the stomach, a clinical and pathologic study, *Arch. Surg.*, 1943, *47*:8.
13. Livingston, E. M. and Pack, G. T. *End-results in the treatment of gastric cancer*. New York, Hoeber, 1939.
14. Parsons, L. The operative curability of carcinoma of the stomach, *New England J. Med.*, 1933, *209*:1096.
15. Allen, A. W. Total gastrectomy for carcinoma of the stomach, *Am. J. Surg.*, 1938, *40*:35.
16. Graham, R. Total gastrectomy for carcinoma of the stomach, *Arch. Surg.*, 1943, *46*:907.
17. Allen, A. W. Carcinoma of the stomach: with special reference to total gastrectomy, *Ann. Surg.*, 1938, *107*:770.

DISORDERS OF THE DIGESTIVE SYSTEM LEADING TO VITAMIN DEFICIENCY STATES IN INFANTS AND CHILDREN*

RUSTIN MCINTOSH

Professor of Pediatrics, College of Physicians and Surgeons, Columbia University, New York

IN times like these the importance of the vitamins in clinical medicine needs no stressing. We are on the lookout for deficiency states which are imposed upon a community through famine, and for those which derive from ignorance of the distribution in natural foods of the essential food factors or from misapprehension of their susceptibility to destruction. In addition to these two main groups, the deficiencies based on inaccessibility of supply and those due to faulty understanding of the requirements, there is a third great class, the deficiencies which are secondary to disorders of the digestive system and which develop because the vitamins are not adequately absorbed or, if absorbed, are not properly utilized within the body. It is this last group on which I should like to focus attention.

Let me cite two examples. As many as ten years ago it was well known by pathologists[1] that histologic lesions pathognomonic of vitamin A deficiency were found at times in patients presenting the characteristic picture of pancreatic fibrosis. For a long time it was not clear which was the primary lesion, which one was secondary. Gradually, in the course of years, an imposing mass of circumstantial evidence was accumulated which left little doubt that the pancreatic impairment occurred first, that this then led to a disorder of pancreatic function in digestion, and that faulty assimilation of vitamin A must be regarded as a later result—that is, as a consequence and not a cause.[2,3] This concept has in the course of time been amply fortified by the results of its clinical application: in many patients in whom it has been possible to establish during life an unquestionable diagnosis of pancreatic deficiency, proper augmentation of the daily intake of vitamin A has

* Read October 14, 1943 before the Sixteenth Graduate Fortnight of The New York Academy of Medicine.

brought about a regression of both clinical and laboratory evidences of vitamin A deficiency, even though pancreatic exocrine function has remained at zero level over a period of years.

A second example has to do with a deficiency of prothrombin formation secondary to acquired hepatic disease. At the age of seven months a female infant suffered a severe febrile illness accompanied by jaundice and enlargement of the liver. The fever and other acute symptoms subsided in the course of a few days, but jaundice and hepatomegaly persisted, along with some loss of appetite, generalized itching, and the passage from time to time of pale stools. A year or so following the original attack of jaundice, a bleeding tendency expressed itself in numerous ecchymoses which followed minor injuries and in prolonged bleeding from scratch marks inflicted on herself by the child in the effort to find relief from constant pruritus; heaped-up, black crusts formed in various parts of the body, especially on the ears. The bleeding time was slightly prolonged, the coagulation time moderately so. Vitamin K—that is, menadione—was administered by mouth in dosage of one milligram daily, with prompt and satisfactory relief of the bleeding tendency and reduction of the prothrombin time from forty-five seconds to a normal level of twenty-six seconds. The patient was eventually shown to have an acquired cirrhosis of the liver on an infectious basis, of which she finally died.

Both of these examples illustrate the influence of clear-cut lesions of organs of digestion in producing impaired absorption of vitamins, in the cited cases vitamins A and K, both of which are lipoid-soluble substances. This brings up a practical point. The early classification of essential food factors in two groups, the fat-soluble and the water-soluble types, fell into the discard to some extent as individual vitamins were identified; but from the point of view of the physiology of food absorption there is eminent reason for reviving this older grouping. Certainly we see numerous instances in which more than one deficiency syndrome within the fat-soluble group occurs in an individual patient; and likewise, though perhaps less commonly, a single subject will be found who presents evidence of impaired retention of several of the water-soluble factors.

Taking up the fat-soluble vitamins first, we find the ones most firmly tied up to defective absorption to be A and K. Clinically, such deficiencies are seen in conditions in which there is a disturbance of

the absorption of food fat—in diseases of the liver and bile ducts which impair the production and excretion of bile, in conditions which lead to inadequate delivery of pancreatic enzymes into the intestinal lumen, rarely in conditions which directly affect the mucous membrane of the digestive tube at the site of fat absorption and interfere with the transfer of lipoids through the gut wall. It is significant that though none of the vitamins is a true fat, their absorption from the chyme parallels closely the efficiency of absorption of food fat; and also that the provitamins, which in some instances—as in the case of vitamin K—may be numerous and chemically somewhat diverse, suffer for practical purposes the same physiological fate as the preformed vitamin.

The kind of clinical situation to which I am referring is of course one in which the principal symptoms are due to the underlying disorder of some part of the digestive system, and in which the evidences of vitamin deficiency creep in so insidiously that they often are not perceived until perhaps too late for regression or repair to be achieved. The whole point is that a great deal can be done to sustain the patient while the struggle against the fundamental disease is going on, provided these incidental risks are kept in mind.

Lesions or functional disorders of the liver, of the pancreas and of the intestinal wall have been mentioned. Some elaboration of these three general themes is in order.

In pediatric practice we look for evidences of faulty absorption of fat-soluble vitamins in congenital atresia or defective development of the bile passages, in obstructive jaundice of any acquired form, usually secondary to some type of infectious cirrhosis, or in acquired obstruction of the common bile duct—the last a decidedly rare event. To be properly forewarned it is enough to know that the patient is deeply jaundiced, has pale stools, and has a high level of serum bilirubin with a large fraction of it giving the direct van den Bergh test. Additional confirmation of the hazard which confronts the patient may be obtained by the simple and quantitatively crude test of fat absorption based on microscopic examination of a stool sample, using Scarlet Red as a fat stain. With a little experience gained from applying this test to a few normal and pathological stools one can soon gauge the fat content of a given sample on a o to ++++ basis with sufficient accuracy to identify reliably the patient whose defect of fat absorption calls for special protective measures.

Of the disorders which reflect primarily a deficiency of the external secretion of the pancreas, the classical example is congenital pancreatic fibrosis. In spite of the emphasis which pediatric thought and writing have put on this disease in the past five years, its importance remains incompletely recognized. From the data of two large pediatric hospitals, the Infants' and Children's Hospital in Boston and the Babies Hospital in New York, the frequency of some degree of pancreatic fibrosis is computed at something near 275 instances among 3400 unselected autopsies, or a rate of 8 per cent among fatal cases of disease of all types. Fibrosis of a severity which suggested from its morphology that the exocrine function of the pancreas had been essentially lost during life occurred in about 1.5 to 3 per cent. Dorothy Andersen's clinical and pathological studies have provided ample warning that pancreatic insufficiency makes itself known under a variety of symptomatic guises: in earliest infancy it is the underlying cause of a variety of intestinal obstruction in the newborn, the so-called meconium ileus; in the next age period, from the age of a week or so to the end of the first six months of life, it provides the background for retarded growth and development or for chronic bronchitis, sometimes with bronchiectasis and pneumonitis; and later, from the age of six months on, it appears under the mask of the celiac syndrome. Accurate diagnosis during life depends on the demonstration, by the application of biophysical and biochemical methods, of absence of the normal pancreatic enzymes from duodenal contents aspirated under controlled conditions. The absence or virtual zero level of trypsin is particularly significant. However, the simple test of stool examination for unabsorbed fat as just described serves a useful purpose as a screening test; for if the patient while on an average diet, in particular, a diet containing fat in customary amounts, shows by this test that he is able to absorb ingested fats to a normal degree, the diagnosis of pancreatic insufficiency is untenable and the more refined and technically more difficult evaluation of duodenal enzyme concentrations may safely be dispensed with. If, on the other hand, the stool fat test demonstrates a significant degree of impaired fat absorption, one must be prepared to go ahead with the procedures which lead to a more certain appraisal of pancreatic performance.

Disorders which have their focus in the intestine itself, and which may lead to defective absorption of fat-soluble vitamins, are not so

well documented by anatomical studies as are those of the liver and pancreas just described. The commonest form is true celiac disease. In this disorder the concentrations of enzymes in the duodenal juice are normal, or nearly so. Faulty absorption of fat is nevertheless an outstanding clinical feature and one which lends itself to quantitative verification by a number of laboratory determinations. Although it is only in the most severe cases that the intestinal wall shows changes of a degree that renders poor fat absorption readily comprehensible, the evidence of a profound functional alteration in digestion and absorption of fat is so clear in all cases worthy of this diagnosis that there is little reason to doubt that the primary disturbance responsible for the syndrome lies within the intestinal mucosa. When the disease is out of hand, when the patient is having a bout of diarrhea and passes numerous bulky stools containing a high concentration of lipids, the risk of clinically significant deficiency of fat-soluble vitamins becomes obvious.

Now what do such threats add up to in terms of the individual vitamins of this fat-soluble group? Experience tells us that, so far as morphological changes are concerned, A-deficiency occurs more commonly in the pancreatic disorders than in those of liver or intestine. Ample warning has been obtained from the pathological studies of fatal cases, so many of which have exhibited the microscopic lesions of a lack of vitamin A in the epithelium of the trachea and bronchi, the conjunctiva, the urinary tract, and in many of the ducts communicating with the alimentary tube. Biochemical studies during life confirm the frequency of deficiency of the fat-soluble group. The concentration of vitamin A in the circulating blood is low, and this is rightly believed to correlate closely with the state of the body stores. Abnormalities also occur in the shape of the vitamin A absorption curve, plotted on the basis of a number of blood level determinations made following the oral administration of a generous loading dose.[4] These last-mentioned observations point the way to successful prophylaxis and therapy, for seldom does one encounter a patient whose blood vitamin A curve does not exhibit some degree of rise in response to the test dose; and consequently one needs only to make certain that the small quantity of fat which gains admission to the body from food supplies shall be accompanied by a rich dietary supply of vitamin A or carotene, or possibly both. Parenteral administration, generally unsatisfactory in

actual practice, is fortunately not needed. In one of our severe and ultimately fatal cases of congenital fibrosis of the pancreas a marked degree of xerophthalmia which was present at the time the child was first examined responded satisfactorily to the oral administration of halibut liver oil, so satisfactorily, indeed, that the eyes had become almost healed at the end of a month. Direct observations of this kind support the hypothesis that the bronchitic and bronchiectatic symptoms which form such a conspicuous part of the symptomatology of pancreatic fibrosis during the first year of life may well represent a deficiency of fat-soluble vitamins, for they often regress markedly when the dose of A and D concentrates is raised to a high level.

The risk of vitamin K deficiency in obstructive jaundice has received so much attention from surgeons that the need for prophylaxis is not liable to be forgotten, even when immediate surgical intervention is not contemplated. Clinically manifest K deficiency seems to occur more frequently in association with hepatic disease than in disorders of pancreatic or intestinal function, possibly because of the part played by bile salts in promoting normal absorption of the vitamin during health. On the basis of actual experience it is hardly to be feared that great harm will be done, or irreparable damage caused, if prophylaxis happens to be omitted up to the point at which the occurrence of superficial hemorrhages or the observation of a prolonged coagulation mechanism brings the need forcibly to mind. In this respect there is no comparison between the seriousness of the potentialities as regards deficiency of K and deficiency of A; the latter is vastly more ominous. Concerning the practical question of how to overcome the deficiency of vitamin K in the presence of impaired absorption of food fat, it is a good working rule that the simplest method which will work is the best one to adopt. Oral administration of some preparation of menadione in dosage of two or three milligrams daily is usually effective, and once saturation has been achieved the dose can safely be dropped to one milligram a day. Although parenteral administration is feasible, it seems to be seldom necessary.

The chance of vitamin D deficiency is not so great as might be supposed. Although the absorption of vitamin D from the diet runs parallel with the efficiency of fat absorption in general, its action in preventing rickets is not in urgent demand when the rate of bone growth has dropped nearly if not quite to the vanishing point, as is

the case in the serious digestive disorders included in this discussion. It is generally recognized that we see in this country far less celiac rickets than is the rule in England, a difference in incidence which may well be due to the prevailing tendency on this side of the Atlantic to supply vitamin D more liberally as a matter of general routine in the care of infants and young children. When clinical recovery from celiac disease sets in, and when the patient begins not only to gain in weight but to grow in stature, then generous administration of calciferol or an equivalent form of D becomes imperative. This applies not only to patients with true celiac disease or idiopathic steatorrhea but also to patients with pancreatic fibrosis and those with obstructive jaundice.

The other fat-soluble vitamins must be passed over in silence for want of evidence.

Turning now to the water-soluble group, for practical purposes ascorbic acid and the various members of the B complex, we realize that they have this much in common, that they can all be shown to be adequately absorbed in all but the most severe grades of disorder of the digestive organs, but that their retention and their proper utilization in enzyme reactions in metabolic processes cannot be taken for granted. Into this deep pit of ignorance only the faintest blush of light has penetrated. We know that any individual who suffers from diarrhea is liable to be in negative balance with regard to thiamin[5] and ascorbic acid;[6] and many of the patients with the disorders referred to are subject occasionally to attacks of diarrhea. Other circumstances such as increased metabolism,[7] high environmental temperature,[8] infection[9] and parenteral administration of large volumes of fluid,[10] any of which may affect these patients in more or less close causal relationship to the underlying disease, have been shown to deplete the stores of one or more of the water-soluble vitamins. Hence, it behooves us to be forewarned and to weigh these potential risks in setting up the program of treatment. The close dependence of normal carbohydrate metabolism on an adequate supply of thiamin emphasizes the special need for that vitamin on the part of patients who, because their absorption of fat is impaired, must derive a large fraction of their energy from carbohydrate.[11]

Therapeutic experiments, many of them admittedly crude in design, have disclosed the rough outlines of some of the physiological principles involved. It is appreciated that the lack of appetite which

accompanies some of these primary disorders of the digestive system may reflect a deficiency of any one of the water-soluble vitamins, and that one cannot trust the patient's appetite to indicate which vitamin or which several vitamins he stands in need of. There is evidence too[12, 13] that some of the water-soluble vitamins play a part in the absorption of dietary fat and thus are concerned in the prevention of deficiencies within the fat-soluble group. Therefore we must resort, at first at least, to parenteral administration and at levels of dosage which will leave no doubt that the needs are covered. The choice of dosage levels must be arbitrary; fortunately there is no demonstrable danger in the case of ascorbic acid if one gives day after day ten or even twenty times the normal daily maintenance requirement. With respect to the components of the B complex, it has been shown that a proper balance must be maintained;[14] if, for example, too much thiamin is given in relation to the intake of niacin, a borderline deficiency of niacin may suddenly express itself in symptoms.[15] Therefore, to avoid this sort of therapeutic ataxia it is wise to employ crude liver extracts, in which the components of the B family occur in proportions which are related to some biological base line, in this case healthy animal tissue, rather than to the arbitrary whim of a compounder of mixtures.[16] When the time comes for a shift from parenteral to oral administration, a preparation made from natural yeast has comparable advantages.

The proof of the pudding is in the eating, and the justification for belaboring at some length the peculiar nutritional needs of patients with serious disorders of the digestive system lies in the satisfactory record which some of them, even some of the worst of them, have achieved over a period of years not only from the standpoint of general growth and development but also by the criteria of avoidance of repeated infections and attainment of a cheerful attitude of mind. A few of the patients with pancreatic fibrosis whose fundamental problem happened to be recognized before irreversible secondary changes in other structures and functions had set in have already enjoyed a life span far greater than had originally been forecast, and continue to return for follow-up visits in a state of health which allows one to hope that this state of affairs will persist. It is impossible to avoid the conclusion that credit must go in no small part to the prophylactic program sketched out, which aims to suppress by-effects of the underlying disturbance even when the latter is beyond the reach of direct

attack. The program itself, while comprehensive in scope, is neither onerous nor elaborate. It merely recognizes that the avoidance of deficiency states in patients with impaired digestion calls for dosage levels of vitamins which for a normal subject would be unnecessarily high and ordinarily quite unjustifiable.

REFERENCES

1. Blackfan, K. D. and Wolbach, S. B. Vitamin A deficiency in infants; a clinical and pathological study, *J. Pediat.*, 1933, *3:*679.
2. Andersen, D. H. Cystic fibrosis of the pancreas and its relation to celiac disease, *Am. J. Dis. Child.*, 1938, *56:*344.
3. Blackfan, K. D. and May, C. D. Inspissation of secretion, dilatation of the ducts and acini, atrophy and fibrosis of the pancreas in infants, *J. Pediat.*, 1938, *13:*627.
4. Flax, L. J., Barnes, M. and Reichert, J. L. Vitamin A absorption and its relation to intestinal motility in fibrocystic disease of the pancreas, *J. Pediat.*, 1942, *21:*475. (Also unpublished observations by D. H. Andersen.)
5. Dann, M. and Cowgill, G. R. Influence of diarrhea on the vitamin B_1 requirement, *Arch. Int. Med.*, 1938, *62:*137.
6. Abt, A. F. and Farmer, C. J. Ascorbic acid absorption in infantile diarrhea, *J. Pediat.*, 1941, *18:*756.
7. Cowgill, G. R. *The vitamin B requirement of man.* New Haven, Yale Univ. Press, 1934.
8. Mills, C. A. Environmental temperatures and B-vitamin requirements, *Arch. Biochem.*, 1942, *1:*73.
9. Abbasy, M. A., Hill, N. G. and Harris, L. J. Vitamin C and juvenile rheumatism, *J. Soc. Chem. Ind.*, 1936, *55:* 841.
10. Cowgill, G. R., Rosenberg, H. A. and Rogoff, J. Studies in the physiology of vitamins; the effect of administration of large amounts of water on the time required for development of the anorexia characteristic of a deficiency of the vitamin B complex, *Am. J. Physiol.*, 1930, *95:*537.
11. Arnold, A. and Elvehjem, C. A. Influence of the composition of the diet on the thiamin requirement of dogs, *Am. J. Physiol.*, 1939, *126:*289.
12. Antognini, R. Stéatorrhée et lactoflavine, *Schweiz. med. Wchnschr.*, 1941, *71:* 510.
13. May, C. D., McCreary, J. F. and Blackfan, K. D. Notes concerning the cause and treatment of celiac disease, *J. Pediat.*, 1942, *21:*289.
14. Morgan, A. F. The effect of imbalance in the "filtrate fraction" of the vitamin B complex in dogs, *Science*, 1941, *93:* 261.
15. Lehmann, J. and Nielsen, H. E. A case of beri-beri (followed by pellagra), verified, and followed during improvement by analysis of vitamin B, in the blood, *Acta med. Scandinav.*, 1939, *99:* 577.
16. Spies, T. D., Swain, A. P. and Grant, J. M. Clinically associated deficiency diseases, *Am. J. M. Sc.*, 1940, *200:*536.

THE PRESENT STATUS OF ULCERATIVE COLITIS AND REGIONAL ENTERITIS*

J. Arnold Bargen

Division of Medicine, Mayo Clinic, Rochester, Minnesota

With the accumulation of experience and the improvement of diagnostic criteria, it has become more and more evident that there are many forms of ulcerative enteritis. All forms of ulcerative enteritis assume in their very nature the status of chronic disease. Hence, the terms "chronic ulcerative colitis" and "regional enteritis" are best used to denote general clinicopathologic syndromes, rather than to designate one of the several specific disease entities in which these syndromes are present.

In medical practice it becomes necessary to study chronic ulcerative colitis and enteritis according to etiologic types, and the first and most fundamental clinical effort should be directed at determining the specific etiologic factor responsible for the development of the syndrome in a given case. The infection may be caused by one or more of several bacteria or animal parasites, in association with certain dietary and constitutional deficiencies, or by other and some still unknown conditions.

We now recognize a variety of inflammatory intestinal conditions. Some of them are strictly localized to the large intestine, others to the small and still others may involve both small and large intestine. It is well, always, to keep this in mind when studying a given case. The concept, advanced by a few, that ulcerative colitis and regional enteritis are all "of a piece" is, in the light of present knowledge, no longer tenable. One must rather think in terms of many disease entities, each having this or that cause with these or those pathologic features and in turn clinical manifestations. If these facts are kept in mind a more rational treatment may be instituted.

Types of Colitis and Enteritis

Strictly speaking, all forms of colitis, ileitis and jejunitis are forms

* Read before The New York Academy of Medicine, October 18, 1943 in the Sixteenth Graduate Fortnight.

of enteritis. However, by common usage the tendency of referring the term enteritis to the inflammations of the small intestine has developed. It is well understood, however, that some forms of ulcerative colitis, although primarily inflammations of the large intestine, may advance orad to involve the distal segments of the small intestine. So also may some primary inflammations of the small intestine advance caudad to involve the large intestine. For practical purposes, however, it is best to discuss separately (1) the lesions primarily confined to the large intestine, (2) those primarily confined to the small intestine and (3) those regional inflammatory conditions which have, in their very nature, a tendency to spread to involve both small and large intestine.

Streptococcal ulcerative colitis: The most common condition of the group involving primarily the large intestine is that commonly referred to as "nonspecific" or "idiopathic" ulcerative colitis. If physicians using the term would apply it to a single disease entity, well and good, but unfortunately a variety of ulcerative intestinal conditions are included under this designation. In fact, some writers include under it all cases of ulcerative colitis which are not of amebic or tuberculous origin. Consequently, the term becomes no longer tenable. The terms "colitis gravis" and "thrombo-ulcerative colitis" are descriptive of the serious nature of the disease and its pathologic inception, and go far in depicting a disease entity. However, since in this discussion I shall aim to give definite status to each form of ulcerative enteritis, I shall refer to this type as streptococcal ulcerative colitis.

This disease has characteristic pathologic manifestations, and hence typical proctoscopic and roentgenologic features. Its lesions begin in the most distal segment of the rectum, just above the anal canal. Diffuseness of involvement of the bowel is its pathognomonic feature. Whether 1 inch (2.5 cm.) of the lower part of the rectum or 5 feet (1.5 meters) of bowel are involved, the involved segment always is affected in its entirety, its entire circumference and the deeper layers of the wall and the mucosa secondarily. This gives the granular, easily bleeding mucous membrane so characteristic of this lesion. The disease tends to spread upward until the entire colon, and even the lower part of the ileum in the late stages of the disease, become involved. Since it is primarily a disease of the intestinal wall, a very characteristic roentgenologic picture develops. The bowel becomes diffusely narrowed, haustral markings are erased, the flexures and curves become more

angulated and the result is a smooth tube. In this, streptococcal ulcerative colitis differs from all other forms of ulcerative intestinal disease, except perhaps regional enteritis when it is confined to the distal portion of the ileum. The latter condition has, however, many features to distinguish it from streptococcal ulcerative colitis. Because of the relatively high incidence of the streptococcal form of ulcerative colitis, and because of the consistency with which its clinical, proctoscopic and roentgenologic manifestations conform to a certain pattern, I am inclined to use this type of ulcerative colitis as a norm and to describe other types chiefly by noting in what respects they differ from it.

This form of ulcerative colitis manifests itself in a variety of ways but in general the clinical manifestations follow one of three general courses. When the lesions are limited to the lower segments of the large intestine, particularly the rectum and rectosigmoid, the onset of symptoms can be described as insidious. The patient may have normal motions of the bowel but in addition may pass two or three or many bloody, purulent rectal discharges. He may not have any other important systemic symptoms except that he will gradually begin to speak of not feeling well. His complaint of not feeling up to par may increase gradually as the number of rectal discharges increases and ultimately a mild form of diarrhea may develop.

The second common onset may be classified by saying that the symptoms are severe. The patient may start rather suddenly with bloody diarrhea, low gradual fever, gradual loss of appetite and with them loss of weight and all the concomitants of a moderately severe illness. All the symptoms may start in a fulminating manner with an onset almost like that of lobar pneumonia or other similar serious illness. There will be a high fever, massive discharges of bloody material from the rectum, great prostration and rapid depletion.

A patient's symptoms may remain in the insidious form for months and years and then at the time of an infection of the upper part of the respiratory tract, some other intercurrent illness or perhaps some severe nervous trauma, there may be a sudden exacerbation of the disease and a change to a severe or even the fulminating form. The question is often raised whether these are different diseases or stages of the same disease. Experience seems to indicate that these are stages of the same disease attacking patients in various ways. Thus, one must be ever on the alert for the occurrence of this disease in these several forms so

that it may be distinguished carefully from the types of colitis which are to be discussed presently.

Amebic ulcerative colitis: Another type of colitis in which the lesions are limited to the large intestine is that caused by Endamoeba histolytica. Here the lesions are localized primarily to the cecum and possibly the flexures of the large intestine, although the entire large intestine may be involved. If the disease has advanced sufficiently toward the rectum so that lesions are visible in its mucous membrane, they present a very characteristic appearance. The ulcers give the impression of being punched out, with raised edges covered by a fleck of mucus and a hyperemic zone around the individual ulcer. Between the ulcers the mucous membrane is relatively normal. The disease largely affects the mucosa instead of the wall and there should be little difficulty in distinguishing this type of ulcerative colitis from the streptococcal variety of ulcerative colitis. Its extension is exactly opposite to that of the latter. Its lesions start in the cecum and spread caudad instead of starting in the rectum and spreading orad as do those of the streptococcal variety of colitis. Consequently, the symptoms are quite at variance to those of the streptococcal variety. Bleeding occurs relatively late in the disease instead of being present as one of the first symptoms. The severe prostration of the fulminating type of ulcerative colitis is observed rarely. The patient is usually in a relatively good condition. Roentgenologic examinations, too, show a rather characteristic deformity of the large intestine when the disease is sufficiently advanced. However, even early in the disease there may be the characteristic features in the cecum: namely, some narrowing and irritability when no other colonic lesions exist. With the progress of the disease the cecum becomes coned or narrowed to a point and the entire ascending colon may be narrowed irregularly. This is not a smooth diffuse narrowing such as one sees in the streptococcal type of ulcerative colitis. As the rectum is approached, there will be less and less roentgenologic evidence of disease except in those cases in which the greatest disease is at the flexures or in unusual segments.

Ulcerative colitis due to the virus of venereal lymphogranuloma: A third form of ulcerative colitis in which the lesions are limited to the large intestine is that caused by the virus of venereal lymphogranuloma. Here again the lesions start in the rectum and distal segments of the large intestine. The disease is also of the wall of the bowel but involves

not only the wall but the lymphatic structures around it and so there develops a condition in which a stiff tube having the feel and giving obviously the appearance through the proctoscope of perirectal inflammation exists. There may be multiple small sinuses from the mucous membrane to the deeper structures and so a rather definite proctoscopic and roentgenologic picture results. The disease will be limited to the rectum and rectosigmoid structures and the normal bowel will be reached much more abruptly than in the streptococcal variety. Almost invariably the patient will feel generally well and his complaints will be largely in reference to the local rectal condition. The diagnosis in this type of case will depend largely on the history of previous venereal infection, possibly the presence of buboes and among women very commonly the presence of preceding vulval lesions. The Frei reaction will be positive. But even if these conditions exist, the diagnosis of colitis due to the virus of venereal lymphogranuloma is not tenable if characteristic lesions of the rectum do not exist.

Regional ulcerative colitis: The fourth type of ulcerative colitis in which the lesions are limited to the large intestine is one of which the cause is not clear. We speak of it as a regional type of ulcerative colitis. The lesions involve isolated segments of intestine and may involve any segment, much in the manner of regional ileitis except that here the site of the disease is the colon. The lesion may be subacute or chronic and usually is quite destructive but also there may be evidence of hyperplastic changes. Commonly segments of the intestine from 6 to 12 inches (15 to 30 cm.) long are found to be involved with perfectly normal bowel distal and proximal to the lesion and always the rectum is not involved. In other words, this segmental type of colitis involves regions of the large intestine above the view of the sigmoidoscope. The wall of the involved segment is *also* stiff and thickened but the involvement is not as diffuse, regular and smooth as in the streptococcal type of ulcerative colitis. Thus, the roentgenologic examination is the most important objective method of establishing a diagnosis. Usually such a regional type of colitis remains localized to a segment of large intestine for months and years. Very occasionally, however, it has been known to spread orad and caudad so that ultimately even the distal portion of the ileum has become involved. The latter has initiated a difficult situation, indeed, and has always brought up the question whether this and so-called regional ileitis may not be the same or closely related condi-

tions. However, the fact that the condition usually remains localized to the large intestine, whereas regional ileitis commonly spreads from the ileum proximad to involve the jejunum and distad to involve the cecum and ascending colon, raises a very definite question of their being separate entities.

Regional ileitis: The two conditions commonly starting and having a tendency toward being confined to the small intestine are regional ileitis and intestinal tuberculosis. Both of them, if they are separate entities, are inclined to remain localized to the small intestine. In both of them, the infection is inclined to spread orad and caudad, thus ultimately involving parts of the large intestine and particularly the ileocecal coil. Thus, for the first condition the term "regional ileitis" becomes particularly suitable. When one speaks of this, one is referring to a subacute or chronic, destructive, exudative and proliferative regional inflammatory process commonly and perhaps usually beginning in the distal portion of the ileum. The name now refers to a definite disease entity well described by Crohn, Ginzburg and Oppenheimer[1] in 1932. In many respects the onset and clinical course of this condition are similar to those observed in the cases of regional colitis. However, patients suffering from the latter condition are prone to be much sicker than those who have regional ileitis. The onset of the disease is usually insidious but by the time medical aid is sought, well pronounced features of advanced disease are frequently apparent and the diagnosis can be readily established.

As with so many chronic infections of a proliferative and destructive nature, the story frequently begins with the complaint of fatigue, general malaise and loss of weight. Associated with these symptoms, or soon after their onset, a patient will complain of a mild, usually intermittent, type of diarrhea. The stools will be loose and watery, and defecation will be associated with cramps. Periods in which normal or even hard, dry stools are passed may alternate with diarrhea. The story in these respects is similar to that of a patient who has intestinal tuberculosis. As a rule, however, in cases of regional ileitis, progression to the next phase is more rapid and symptoms are more severe than in cases of intestinal tuberculosis. In the former, attacks of abdominal pain supervene and the pain may be of the dyspeptic or obstructive type from the first. In either event, obstructive features will soon predominate.

Generally speaking, there are four phases of the disease. The earliest

manifestation is that of an acute inflammatory process. As the terminal portion of ileum is the most frequent initial site of the disease, irritation of this portion of the intestine and its adjacent peritoneal covering produces a picture difficult to distinguish from acute appendicitis. The most common symptoms are fever of low grade, leukocytosis, nausea, vomiting, and tenderness and pain in the epigastrium or right lower abdominal quadrant. Diarrhea and cramps are unusual at this stage of the process.

As the disease advances, intermittent attacks of diarrhea are characteristic. The typical syndrome of enteritis of low grade then prevails, for the patient has fever, anemia and a palpable mass in the right lower abdominal quadrant and has lost weight; his stools are loose or watery and if any pain is present it is mild and colicky.

Remission of symptoms is common in the two stages described, but as the stenosing effects of the disease increase, the periods of relief are shorter and occur less frequently. The symptoms typical of intestinal obstruction are superimposed on those of chronic enteritis. The attacks of diarrhea are more profound and are accompanied by severe abdominal cramps, borborygmus, abdominal distention or visible contracture of the coils of the small intestine proximal to the diseased segment. Malnutrition and anemia become prominent features since much of the nourishment and fluids is lost because of the diarrhea. Furthermore, intake may be greatly limited on account of persistent nausea or even vomiting.

The fourth and final phase of the disease is attained when either acute obstruction is superimposed on the chronic condition or perforation of the bowel occurs and there ensues the formation of an abscess or fistula. The fistula may communicate with an adjacent portion of the intestine, with other viscera or with the abdominal parietes. The debility occasioned by the sepsis and deprivation of nutritional elements and fluids assumes great significance and in itself may be the terminating factor.

The course of regional enteritis as delineated is uniform only in a very general way. In the individual case the first signal of impending trouble may be the onset of the syndrome of the late phases, or the symptoms may have progressed from an occasional episode of pain in the right lower abdominal quadrant or the epigastrium to intestinal occlusion, although there may have been little intervening disturbance.

In an occasional case the chief complaint will be the one which is only remotely associated with the malady.

These facts and others to be mentioned concerning the pathologic changes of the diseased segment of bowel give further evidence of the destructive, proliferative and progressive nature of the disease. Generally speaking, when one first sees these patients the disease is in the advanced stage and the pathologic process already has produced unmistakable gross deformity. There is evidence of attempted fibrotic repair associated with chronic inflammation on which acute exacerbations of the disease have been superimposed. Pathologic descriptions of the condition have been comparatively uniform. The terminal portion of ileum, as has been indicated repeatedly, is the segment most frequently involved. Thickening of the wall of the bowel, narrowing of the lumen of the bowel and ulceration of the mucosa with the formation of pseudopolyps are noted. These associated characteristics have been described often as granulomatous ileitis. The character of the lesions may range from subacute to chronic. At times the intestinal wall is greatly thickened by edematous infiltration. Pseudotubercles, in association with large foreign body giant cells, are common. Perforation with the formation of an abscess is fairly common. As a result of this, multiple communicating fistulas may develop. These are the result of chronic perforation which takes place so slowly that time is allowed for segregation of the process from the peritoneal cavity and usually small walled-off abscesses form. These, in turn, discharge their content into a neighboring viscus. Grossly, the most striking features are typical enlargement and loss of flexibility of the affected segment of bowel and shortening and great thickening of the mesentery, in which the regional lymph nodes are large and firm. The tissues have a dusky, bluish red appearance and a phlegmonous exudate is distributed over the serosal surface of the intestine.

In the instances in which the condition is of long standing, many exacerbations usually have occurred and a large phlegmonous mass may have resulted. It is often very difficult to separate such a mass from the surrounding structures. At times, too, such lesions may affect the bowel in segmental fashion with relatively normal uninvolved segments lying between the involved portions. The involved segments are readily distinguishable from the normal portions by their loss of elasticity and soggy hoselike appearance. The microscopic appearance of the lesion

does not have any characteristics which distinguish it from other chronic inflammatory processes. Cells of the lymphoid series appear to predominate, except in the earlier, more acute stages. In the chronic process, the small lymphocyte, plasma cell and fibroblastic elements are in the ascendancy; eosinophils may be present. Submucous lymphoid follicles are usually very numerous. Giant cells are encountered frequently and often contain crystalline or lipoid particles. Focal collections of lymphocytes under the serosa with the giant cells here and there make the picture simulate tuberculosis.

Tuberculous ileocolitis: Another type of enteritis attacking primarily the small intestine is that due to Mycobacterium tuberculosis. The disease may be of the nature of extensive enteritis involving stretches of the intestine with rather normal segments of bowel between. The ulcers will be distributed irregularly and associated with lesions visible on the serous surface of the bowel and with miliary tubercles. The most extensive lesions will usually be in the distal segment of the small intestine and may extend to involve the cecum and other segments of the large intestine. This infection commonly attacks the ileocecal coil and it is at this point that the disease has its greatest activity. Only in the late stages will the lesions progress sufficiently caudad to be visible through the sigmoidoscope. Thus, the roentgenologic features will show characteristic irritability with rapid emptying and filling of the ileocecal region and great irregularity of the intestinal lesions will be observed in the roentgenogram. The smooth contour of the intestinal wall so commonly seen in the streptococcal type of colitis is not present in tuberculous ileocolitis. The disease again involves the mucosa more than the wall.

Other intestinal conditions: Other intestinal conditions which may or may not be of the nature of inflammatory disease are the following: (1) chronic bacillary dysentery; (2) ulcerative colitis of unknown cause (for those who still cling to the term nonspecific or idiopathic, the term might be applied to this group of cases); (3) a deficiency syndrome; (4) so-called allergic colitis.

There is a form of ulcerative ileocolitis which follows in the wake of severe bacillary dysentery due to one or several of the strains of Shigella paradysenteriae. Penner and Bernheim[2] have shown recently that the lesions of bacillary dysentery are in the nature of toxic reactions mediated through a sympathotonic reaction. This might explain

the fact that the lesions are also irregular and disseminated. In the occasional case in which extensive destructive ulcerative disease occurs, secondary invaders may be responsible for the late lesions. When lesions are visible through the sigmoidoscope, their irregularity as far as size, extent and mucosal appearance are concerned is particularly striking. It has been said that they are characteristic because of their irregular and yet extensive distribution. The same impression is gained from the roentgenologic appearance of the bowel in these cases. Still, the diagnosis will depend largely on the presence in the blood of agglutinins (in significant titer) of one or several strains of Shigella paradysenteriae.

One is particularly impressed with the latter fact when encountering cases of ulcerative ileocolitis belonging to the group which I have designated as of unknown cause. Here again the ulcerative disease may be extensive, involving long stretches of small and large intestine, or it may involve only the rectum and sigmoid. Whatever segment is involved, the appearance of the lesions is at variance with those of the conditions described having a specific cause and strikingly at variance with the appearance of the bowel in the streptococcal variety of ulcerative colitis. Agglutination of Shigella paradysenteriae will be absent. Culture made from the lesions and examinations of the stools will not be diagnostic. The lesions will be distributed irregularly and tend to resemble those of amebiasis or tuberculosis. Yet, usually one will detect differences. The differences are sometimes hard to describe, and it has been said that the ulcers are characteristic by being so uncharacteristic. The same thing will hold true as far as the roentgenologic examination is concerned. This is the group of cases that will particularly tax the physician's ingenuity and the response to one form of therapy or another will often be minimal. In these cases, too then, surgical intervention will more often be employed.

The type of intestinal disorder of the nature of a deficiency syndrome, other than sprue and pellagra, should actually not be discussed here. It is brought up only because there are still some who feel that the deficiency state plays a primary role in some of the types of ulcerative colitis which have been discussed. The history of patients suffering from an intestinal disorder in which a food deficiency is important is usually characteristic. Such persons may have gone for months and years on an inadequate dietary regimen. The result may be atrophy of

the intestinal wall. The appearance of the bowel through the sigmoidoscope may suggest diffuse hyperemia. No real ulcers will be present. The roentgenogram may show dilatation of the large intestine with minimal changes of the mucosal pattern in the form of what appears to be a "fuzziness" of the mucous membrane and in the small intestine a typical pattern of barium puddling and segmentation will be observed.

What has been said about the deficiency syndrome affecting the intestine might also be applied to so-called allergic colitis. Everyone will accept the fact that there are patients who exhibit symptoms of intestinal allergy. Few will be impressed by the thought that such allergy is a primary factor in ulcerative intestinal disease. It seems obvious that occasionally in severe cases of intestinal allergy, mucosal abrasions may occur so that ulcers of a transient nature may be present. There is, however, little or no evidence available that these form the basis of a type of ulcerative colitis. It would seem better to consider intestinal allergy as a condition quite apart from the big problem of ulcerative enterocolitis, in the realization that it may play a part in many ulcerative intestinal inflammations but that it is not necessarily causative in any of them.

Conclusions

This discussion emphasizes the fact that there are many varieties of ulcerative enterocolitis. One cannot emphasize too strongly the importance of establishing as nearly as possible the nature and cause of a given case. Each type recognized to date has some characteristic features which set it apart from the others. In the streptococcal variety, the diffuseness of involvement and the typical proctoscopic and roentgenologic pictures together with the finding of the streptococcus are important. In the amebic, the finding of Endamoeba histolytica is of the greatest importance. In tuberculous colitis, the presence of Mycobacterium tuberculosis, together with the history and finding of tuberculosis elsewhere, is of great value. In the cases due to Shigella paradysenteriae significant agglutinin titer of the blood serum is significant. In the cases due to the virus of venereal lymphogranuloma, the positive Frei reaction and the characteristic appearance of the lesions are essential. In the regional types and the groups still of unknown cause, continued and careful study is essential. It is important that these be not

confused with those forms of ulcerative colitis of specific cause and characteristic features.

REFERENCES

1. Crohn, B. B., Ginzburg, L. and Oppenheimer, G. D. Regional ileitis; a pathologic and clinical entity, *J.A.M.A.*, 1932, *99:*1323.

2. Penner, A. and Bernheim, A. I. Studies in pathogenesis of experimental dysentery intoxication. *J. Exper. Med.* 1942, *76:*271.

THE BASIS OF A CLASSIFICATION OF DISORDERS FROM THE PSYCHOSOMATIC STANDPOINT*

LAWRENCE S. KUBIE

I. INTRODUCTION

THE psychiatrist who works in a general hospital is consulted by his colleagues on a wide variety of problems. His assistance is sought in differential diagnoses, in treatment, and with increasing frequency in joint research on the interrelationship between psychological and physiological levels in the body's experience, as this interrelationship influences the course of some specific disorder.

It is not strange that in the effort to characterize widely different psychosomatic relationships, a host of terms has come into use, such as: conversion symptoms, hysteria, body reference, body representation, somatic compliance, organ inferiority, constitutional inadequacy, pathoneurosis, organ neurosis, actual neurosis, neurasthenia, sexual neurasthenia, hypochondriasis, hypochondriac, chronic invalidism. These terms have no constant usage. Their meanings overlap, their implications vary, and they fail to characterize the nature of the psychosomatic interrelationships which it is their purpose to indicate. It is this situation which has instigated the present effort to bring some systematic order into this chaos, by arranging the phenomena in groups which have logical, physiological, and psychological implications.

II. BASIC TYPES OF PSYCHOSOMATIC RELATIONSHIP

Two fundamental categories of psychosomatic relationship are recognizable: to wit, susceptibility, and somatization.

A. SUSCEPTIBILITY

Susceptibility includes the differential susceptibilities of different morphological, physiological, and psychological types to different dis-

* Read April 13, 1943 at a Joint Meeting of the Section of Neurology of The New York Academy of Medicine and the New York Neurological Society.

eases. This ancient and honorable field of medicine disappeared from medical studies for many years, only to reappear recently in the studies of physiological and morphological types by Kretschmer,[1] Draper,[2] Wertheimer and Hesketh,[3] Sheldon,[4] and others. The reawakening interest in the correlation between psychological types and such physical diseases as arthritis, various kinds of heart diseases, diabetes, and even the proneness to accidents, is due almost entirely to the pioneer work of Dunbar and her associates.[5]

The present study of classification will not attempt to include the field of *Susceptibility*, because it is a phase of the problem which can best be analyzed by those who have been working directly with it.

B. SOMATIZATION

The Stages of Dissociation:

Somatization is proposed as a general term for any process by which tensions which are generated on the level of psychological experience are given some form of bodily representation and a partial discharge through anatomical and physiological disturbances. Somatization may be purely sensory, purely motor, purely secretory, or a combination of all. It will be seen that somatizations will fall into four major groups, depending partly upon the structures involved and their psychological and physiological functions, and partly upon the particular aspect of the organ system which is involved. Before discussing these, however, it is necessary to consider the steps by which tensions generated on the psychological level can be translated into somatic dysfunction. These steps constitute a continuous physiological series of increasing complexity, in which the disturbed physiological process becomes dissociated more and more completely both from its original physiological function, and from any conscious ideational content.

All psychosomatic phenomena are produced by the play of opposing forces: human needs and impulses struggling either against external obstacles or dangers, or against internal inhibiting mechanisms such as guilt and anxiety. With any obstruction to the free flow of an impulse towards its gratification the level of internal tension rises. At some point this rising pressure of central excitation must overflow. The overflow may be effectively channeled through some external action with increased energy which overcomes the obstacle and achieves the goal, or it may be diffuse and chaotic; or it may focus on some part function,

setting up what the engineers characterize as a "feed back" system, in which part of the energy output is itself used to reactivate the system.* This state of physiological struggle with mounting tension and discharge is accompanied on the psychological level by frustration, resentment, guilt, and anxiety, with subsequent repression and varying degrees of symbolic representation of the conflict.

The essence of the process consists then in this rising tide of excitation, the functional overflow and the feed-back from this overflow which prevents a total physiological discharge of the energy system unless the functional overflow is effectively channeled. This overflow can be seen to occur in certain definite steps. The rising tide of excitation which is the origin of the entire psychosomatic process, may itself have many sources, all of which have in common the fact that they create tension. Of these, the simplest is the experience of pain; and in outlining these steps pain can be used as the paradigma of all:

Step 1: Pain in an uncomplicated situation gives rise to an automatic reaction of withdrawal or riddance. If this is effective, nothing more happens.

Step 2: Pain is not always mastered so easily. Its source may be internal, or its external source may pursue the victim. This leads to intensified action, such as sustained flight or fight, which calls into action the autonomic functions of the body to reënforce and support the simpler sensori-motor reactions, and to maintain homoeostasis. It is at this point also that the first experience of conscious emotion enters the picture. For this reason it is usually assumed that the autonomic functions are an intrinsic part of the emotional reaction per se. In fact, the entire James-Lange theory was built upon that assumption. Actually the primary relation of the autonomic functions is to the intensified action, and only secondarily to the emotional state.

Step 3: For many reasons, however, pain may not always lead to direct action either of flight or fight. Because of inner conflicts all overt responses may be withheld: and in this situation the individual may feel highly emotional and may have strong autonomic discharges, but without going into action. In fact, in social situations this is one of the frequent human experiences. Everyone is familiar with the occurrence under emotional stress of such phenomena as blushing, sweating, lacrimation, puffing, panting, shivering, shaking, dyspnea, palpitation, polyuria,

* We are indebted for this illuminating suggestion to Dr. Warren S. McCulloch.

and the like. Indeed, so constant is their association with conscious emotions, that they are looked upon as an intrinsic part of the emotional pattern itself. Yet the primary physiological function of each of these phenomena is to assist the body to adjust to changing states of total activity. Emotion comes into the picture only when these efforts encounter obstacles which threaten frustration. However, since some measure of frustration is implicit in almost all human activity, by direct conditioning all such bodily changes, although originally they were related only to alterations in the level of total activity, become secondarily linked to the accompanying emotion. Thus it becomes possible to sweat or blush or puff or palpitate in a moment of emotional excitement, quite apart from any alteration in total activity. For that moment, these phenomena have lost their original physiological functions, and may even have become destructive.

To recapitulate: the physiological phenomena which are ordinarily accepted as inevitable concomitants of emotion per se, were originally the concomitants only of changes in activity. By conditioning they become linked to emotional states, with the result that the emotion, even without any change in total activity, can become the conditioned signal for the physiological change. This constitutes the first step in the sequence of events which we call the psychosomatic process.

Step 4: Guilt and anxiety may lead to a further step in the process of dissociation and repression. "Pain" may be followed by an autonomic discharge alone, with a suppression of all external response and the repression of all conscious emotion. The autonomic physiological phenomena of reënforcement and homoeostasis then occur in the absence of any conscious emotional state at all, or else in a setting of what seem to be "weak" or inadequate emotions. This will be recognized as a clinical syndrome which is as familiar as the common cold, i.e., the individual who has to urinate more frequently than is physiologically indicated, or who sweats or gasps or blushes or pants or palpitates without being aware that his emotions have been stirred. Under these circumstances the physiological processes are often called "emotional equivalents," or else it is said that the emotions were "too weak" to explain the physiological disturbance. Both of these phrases are misleading insofar as they tend to perpetuate the idea that the physiological changes have their origins in the emotional state as such. In all such cases it is easy for the physician to recognize the play of emotion below the surface, even if the patient

TABLE I

STIMULUS		PRIMARY REACTION	SECONDARY REACTIONS	PSYCHOLOGICAL REACTION
Tension-creating stimuli:		*Tension Reducing*	*Autonomic reënforcement and support and homoeostatic compensatory changes*	*Conscious emotional arousal*
Either External—e.g., pain	1.	Successful effortless withdrawal or "riddance"	0	0
Or Internal—e.g., instinctual demands represented by enteroceptive sensations	2.	Effortful struggle (fight or flight)	+	+
	3.	0 (Suppressed)	+	+
	4.	0	+	0 (Suppressed)
	5.	0	0	0
		Overflow to and feed-back from substitutive organ changes		

himself succeeds in being unaware of it. These are the everyday, run-of-the-mill anxiety states expressed through mild somatic phenomena. Again, however, it is important not to allow the fact that these are familiar to blind us to their significance as a step in the dissociation of the physiological process from its original function and towards the production of a psychosomatic distortion.

Step 5: The next step is perhaps the most important. All three of the initial components of response are eliminated, i.e., external action, the supporting and reënforcing autonomic functions and the conscious experience of emotion. With the suppression of all of these three immediate reactions, a temporal dissociation occurs. The internal tensions no longer are transitory and episodic, but constant and continuous in their influence on body functions. The discharge of these chronic tension-states then falls logically, physiologically, and psychologically into one of four over-all categories. The discharge may be primarily on the exter-

nal orientative functions, or it may be internalized, or it may focus on the instinctual organs, or it may be diffused. These four alternatives are what lead to the four basic categories of psychosomatic dysfunction.

These steps are represented in Table I.

C. SOMATIZATION

The Four Major Categories:

1. Organs of External Relationship: Certain somatizations involve the exteroceptive sense organs, the striated muscles, the organs of speech and their central control, and the central organizing functions of the brain—in short, the organs which subserve the external relationships of the individual, his orientation in space and perhaps in time, his ability to communicate with others, the sensory impressions which reach him from the outside world and his ability to organize them, and his conscious orientative faculties. These are essentially the organs of the Ego, as the term is used psychoanalytically. In current psychiatric parlance, disorders in these functions are ordinarily classified as conversion hysterias. All of these organs occupy a clearly defined place in conscious thoughts. They are the objects of complex ideational processes, which in turn the organs themselves can symbolize.

Yet these organs of external orientation are also served by smooth muscle, blood vessels, and local secretory glands. The motor components of these subsidiary structures are not under conscious voluntary control; and their sensory components are enteroceptors. Examples are the smooth muscle of the eye and of the blood vessels, the sweat glands, pilomotor apparatus and smooth muscle of the skin, the mucous cells of the mucous membranes, and the organs of kinaesthetic sensation, of equilibrium, and of deep pressure and pain. Thus it is only the more external aspects of the Organs of External Relationships that enter fully into our conscious perceptual and ideational world. These subsidiary components have varying degrees of conscious representation; and play a relatively obscure role in the psychic processes which underly and accompany psychosomatic disturbances in this area. They may or may not be involved along with the structures which they serve. Where they are, they mark a transition both physiologically and psychologically between the external somatizations and the deeper somatizations which will be discussed next.

2. *Organs of Internal Economy:* The process of somatization may involve only those internal organs which lie within the interior of the body, and which consequently are hidden from the patient's eyes and largely from his direct knowledge. About certain of these organs everyone has some subjective information, as for instance, the intestinal tract, the bladder, the heart, and the respiratory apparatus. They are known through their excretory products, or from the specific sensations to which they give rise or both. Nevertheless, knowledge of these organs and of their functions is far less precise than is the knowledge of any more external aspect of the body.

Other internal organs such as the bone marrow, spleen, lymph, or blood vessels, give rise to no excreta, and normally to no specific or localized sensory impressions. Under pathological conditions some of them enter consciousness through vaguely localized and non-specific sensations of pressure, distension and pain. Others have no such local signs under any circumstances. Thus they constitute an area of potential body-change which goes beyond the range of subjective experience. Nevertheless, their functions are not free from interaction with psychological levels of experience. The tensions which derive from frustration and from conflicts between opposing inner drives may overflow in such a way as to involve these ghost-like inner functions.

In general, therefore, this large group of internal somatizations includes disorders of the heart and blood vessels, of the respiratory organs, of the gastrointestinal tract, of the liver, pancreas, thyroid, and other endocrine glands.

Clinically, physiologically, psychologically, and from the point of view of psychiatric prognosis, this group presents problems which are distinct from the first. In the first place, just because the interior of the body is mysteriously hidden, and because of the vagueness of the sensations which they generate, disturbances in these functions often give rise to extensive and fantastic psychological elaborations. For this and other reasons, certain of them are often found in a psychotic or pre-psychotic setting. Furthermore, because of the specific importance of the organs involved, and because of the interaction with glands of internal secretion, any interference in their proper functioning has far-reaching and sometimes disastrous secondary effects on the body as a whole, whereas even the most serious disturbance of function in the Organs of External Relationship leaves the body as a whole unimpaired.

3. Organs of Instinctual Function: This third group involves the apertures of the body, the organs of intake and output for food, air, and excreta, the swallowing mechanisms of the mouth and throat, the appetites, and all genital functions. Because all of these serve instinctual needs and discharges directly, they constitute foci of special significance. They involve external relationships, but on an elemental instinctual level. They also involve the internal vegetative functions of the body, but only secondarily. Thus they are transitional physiologically as well as anatomically between the organs of External Relationship and of Internal Economy. As examples of disturbances in this group we might mention the dyspareunias, vaginismus, frigidity, all disturbances in male potency, spermatorrhea, air hunger, over-ventilation, sphincter disturbances, retention, constipation, anorexia nervosa, etc.

In current psychiatric thinking, disorders focused on this group are usually linked with one of the other two. Both for theoretical and clinical reasons, however, it is helpful to recognize their special and intermediate significance.

4. The Body as a Whole: Finally, there are patients in whom the physiological disturbances or feelings of disability focus on no special organs or areas of the body, but seem rather to involve the entire body, as though it constituted one vague and mystical unit. Here we find states of fatigue and general weakness, of diffuse hypochondriasis, or chronic invalidism, and of fretful neurasthenia. It may fairly be questioned whether these conditions need a separate category of their own. In many instances a careful anamnesis or a period of analytical study makes it clear that diffuse complaints about the body as a whole mask earlier specific disabilities which fall within one of the first three groups mentioned above. In many of the fretful neurasthenias the early and formative stages of the illness are characterized by specific difficulties in one of the instinctual spheres: hence the so-called "sexual neurasthenias." A large proportion of the chronic invalids give an early history of disturbances in the Organs of External Relationship. Many of the diffuse hypochondriases have had earlier difficulties in Organs of Internal Economy.

Nevertheless, in a number of patients diffuse complaints persist that cannot be broken down into earlier disturbances referable to one of the three more localized areas. For this number, however small, it would seem wise to preserve this fourth category, with its diffuse reference to

the body as a whole. Furthermore, this fourth group may have important clinical correlations; and the dynamics of the tendency towards a diffuse body reference may prove to be significantly different from the dynamics of the tendency toward special zones of reference. This clinical group must be more carefully investigated before its relationship to the other three can be settled definitively.

5. Nomenclature: We propose, therefore, the following basic groups: Somatizations of the Organs of External Relationship; Somatizations of the Organs of Internal Economy; Somatizations of the Instinctual Organs; and Diffuse Somatizations of the Body as a Whole. Not infrequently, somatizations will occur in more than one body area at the same time; and occasionally different somatizations will alternate with each other. Usually, however, the four basic groups occur independently of each other. It is this, among other considerations, which gives them significance. These terms have the further advantage of being descriptive. They should serve well, therefore, as guides to clinically important and reasonably distinct groupings of psychosomatic phenomena.

A shorter nomenclature for these four basic groups presents certain difficulties. The simplest would be to call them respectively external, internal, instinctual, and diffuse somatizations. The latter three are possibly acceptable. The word "external," however, hardly does justice to the underlying concept. If the word "Ego" were widely used in its analytic connotation and not with its ordinary idiomatic meanings, we might speak of "Ego-organ somatizations." In the absence of any general understanding of this term, however, it would not be useful. It is strange that language has no single word to cover the totality of this function: namely, the orientation of the individual towards the world, his ability to communicate with it, his sensory intake from it, his motor output towards it, and his perceptual organization of this material. This is the function a disturbance in which is usually called an "hysterical conversion," and for which we suggest here the somewhat cumbersome term, "Somatization of the Organs of External Relationship."

Although most psychosomatic disorders fit easily into one of these four categories, dilemmas arise in a few cases. For instance, allergies are usually grouped together because of the presumptive similarity of the underlying biochemical process. Both psychologically and physiologically, on the other hand, the diversified distribution of allergic phenomena is of more importance than its biochemical unity. This makes

it appropriate to place differently situated allergic manifestations in different categories. Similarly, since the skin constitutes a single anatomical structure one might expect to classify all psychosomatic skin disorders together. This would be misleading, however, because psychologically, and to some extent physiologically, the skin subdivides into three functional areas. The exposed areas of the skin of the face and hands constitute an important component of the Organs of External Relationship. The skin around instinctual organs partakes of their physiological and psychological significance. The rest of the skin surface, which is ordinarily covered by clothing, is treated psychologically as though it were an Internal Organ. Obviously these differences must be taken into account in the grouping of skin disorders.

The point of view which has been set forth here is expressed diagramatically in Figure 1.

6. Discussion of Classification: The major usefulness of such a system of classification as this is to indicate the final common pathway of the psychosomatic process, rather than its secondary physiological supporting mechanisms, or the ultimate sources of the psychological tensions and instinctual energies which converge upon it. It is like naming a wind by the direction towards which it blows rather than that from which it comes.

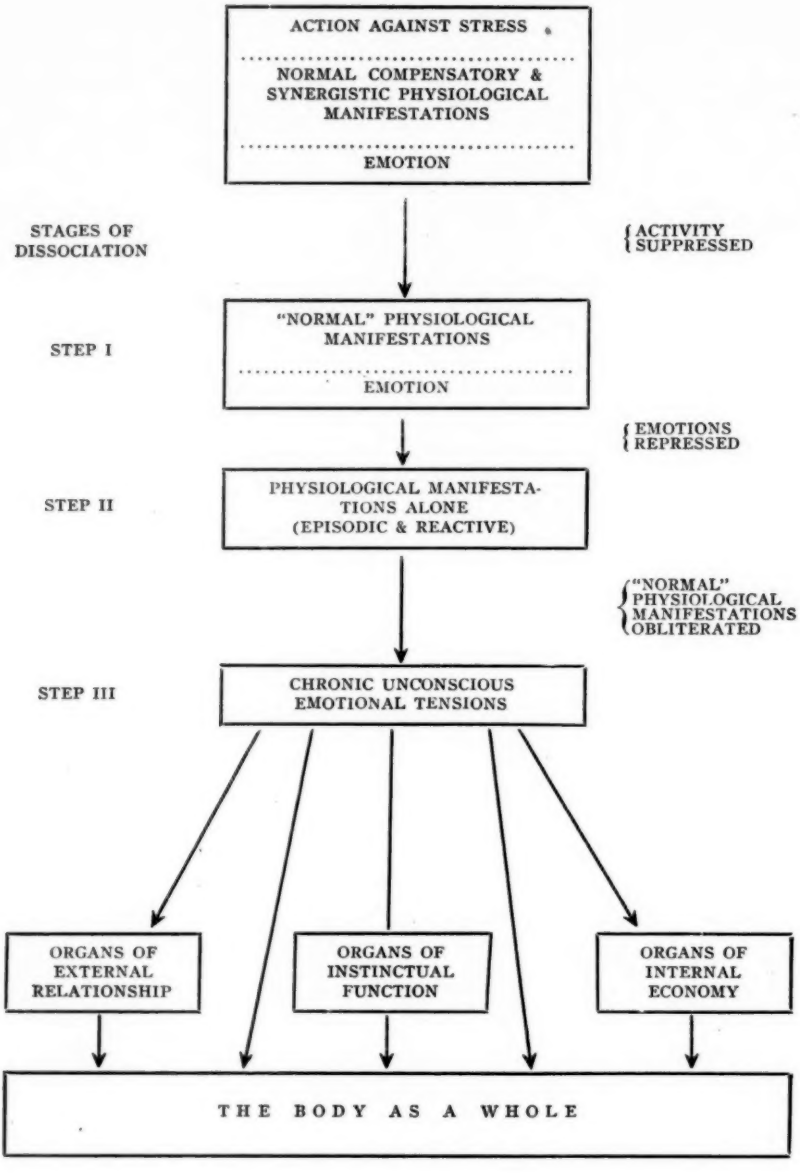
A. Overlapping Areas:

The fact that the process of somatization is rarely if ever focused exclusively on one area without some accessory involvement of the others does not lessen the usefulness of this classification. For instance, in a writer's cramp or an hysterical paralysis of a limb, there may be secondary vasomotor and secretory changes involving vascular structures, the involuntary nervous system, and even such glands of internal secretion as the adrenals. Notwithstanding this, since in such a case it is evident that these play a supportive rather than a primary role, there would be no uncertainty as to its position in this classification, nor is this altered by the fact that any such disturbance in the function of the hands will derive some of its energy from conflicts in the instinctual spheres.

Similarly, a case of Raynaud's disease manifested in the engagement-ring finger after the breaking of an engagement, would be an example of an Internal Somatization; because the primary process is in the autonomic and endocrine control of the vascular tree; and is only secon-

FIGURE 1

THE PROCESS OF SOMATIZATION



darily focused on an organ of external relationship of special emotional significance.

A more complicated problem is presented by the case of a man whose nose would blanche every time he had an erection. The nose is an organ in its own right in terms of respiratory function. Its position on the face makes it at the same time a presenting feature of the personality and thus a component of one of the Organs of External Relationship. Finally, it is involved through the sense of smell in esthetic responses, in eating functions, and in sexual reactions, and in addition is frequently used as a symbolic representative of the genitals. Despite this multiple significance of the nose, since there was no disturbance of instinctual or internal functions, this would be an instance of a somatization of an Organ of External Relationship.

Such a multiplicity of psychological and functional relationships is somewhat rare, but must be taken into account in evaluating the role which any organ or area plays in a psychosomatic disturbance. In the case in point, in which vasomotor change in the nose and in the genital always occur synchronously, a single physiological expression is provided for the multiple underlying conflicts which arise out of instinctual pressures. At the same time it brings into clear relief the significance of instinctual conflicts in external relationships. The expression of most instinctual needs, and particularly of the sexual needs, always involves interpersonal relationships.*

It is not surprising, therefore, that psychosomatic disturbances of sexual functions tend so often to be accompanied by disturbances in the organs of external relationship, or that the latter may be substituted for the former. This was recognized first by Freud as typical for the process which he called the "hysterical conversion" syndrome. Because of the great importance of this observation, a tendency arose to conclude that this association is invariable, and to overlook the fact that disturbances in any organs of instinctual function can occur without involving the organs of external relationship, as for instance in Spermatorrhea. A failure to realize this has led to debates over whether to call Spermatorrhea an "Organ Neurosis" or an "Hysterical Conversion." To call it an Instinctual Somatization is clearly more accurate than either.

* The biological significance of these basic groups was recognized by the late Raymond Pearl[6] in his lecture on "Constitution and Health." In discussing the relation of the classification of disease to the "innate biological (constitutional) worth or value of certain organ systems," (p. 29), he brings out the fact that certain organ systems come into direct contact with the external environment, whereas others do not; and that profoundly different physiological and psychological consequences derive from this fact.

Disturbances which involve primarily the organs of internal economy occasionally but less frequently have concomitant secondary involvement of other basic areas. At times one area will even alternate with another, e.g., an ulcerative colitis wtih a dermatitis. All of these overlapping interrelationships make it evident that the four basic areas constitute four points in a series of continuous and not discontinuous phenomena.

B. Ideational and Perceptual Content:

Similarly, with respect to the role that conscious ideational and perceptual processes play in the process of somatization, these four zones highlight four major points in a continuous series. At one end stand the somatizations which involve the most exterior aspects of the organs of external relationship, about which we can perceive and think most clearly. Under stress, however, as was pointed out above, their activities are supported by synergistic functions which bring into play progressively deeper and more obscure internal organs. These range from local sweat glands, and local blood vessels, to the homoeostatic systems which do not enter into conscious ideational processes at all. At the other extreme are the Organs of Internal Economy. The instinctual organs occupy an intermediate place in perceptional and ideational processes, more diffuse in their sensory qualities (i. e., "protopathic"), with a greater degree of reflex automaticity, and functioning with a high degree of automatic coördination with subsidiary vegetative processes.

These considerations lead us to reject any absolute distinction between the disturbances in organs of which we have subjective awareness, and those from which we receive no conscious sensations.

C. Motor versus Sensory:

We would also reject any hard and fast distinction between subjective (sensory) and objective (motor) disturbances. These are differences of degree and not of kind. Recent experiments indicate that there are afferent impulses from and some degree of cortical representation of all viscera. It is only the precise degree, locus, and nature of this representation which remains a matter for further experimental demonstration. If this be true, then a functional overflow from psychological to visceral levels can occur centrally, irrespective of the degree of con-

scious subjective awareness, on the familiar patterns of the conditioned reflex. The specificity of the conscious or unconscious fantasies which are mediated by this central neuronal activity would depend only upon the degree of differentiated, spacially localized sensory modalities by which any particular organ or function is represented. Obviously the exterior aspects of the body are centrally represented with sharper differentiation and greater detail and precision than are the more obscure internal organs. But since these also have central representations, even if to a less sharply differentiated or localized degree, they too are susceptible of involvement in chains of conditioned reflexes and are therefore subject to the same type of overflow as that which mediates the familiar phenomena of the "anxiety equivalent," or the "hysterical conversion syndrome."

Therefore, afferent impulses from all motor activities and from all organ functions must influence the flow of conscious and unconscious fantasy even when these afferent impulses are devoid of specific conscious representation. Similarly all conscious sensory manifestations contain the potentiality of overflow into channels which will disturb organs which themselves have no role in our conscious processes. Thus these differences are superficial and rest upon no basic differences of mechanism. The intimate interweaving of all afferent and efferent phenomena in the functioning of the central nervous system makes unwarranted any classificatory differentiations on the basis of sensory or motor, conscious or unconscious.

III. The Psychopathological Setting

The clinical evaluation of such illnesses depends partly upon the type of somatization, and partly on the general psychopathological setting in which it occurs. For the evaluation of the whole picture, therefore, the psychopathological settings may be divided into four major categories.

a. The psychoneurotic constellations
b. Neurotic behavior disorders
c. Psychopathic behavior disorders
d. The psychoses

The *addictions and perversions* constitute a fifth aspect of the psychopathological setting, whose relationships to psychosomatic disorders must also be considered. It is not necessary here to present in full the

FIGURE 2

PSYCHOSOMATIC INTERRELATIONSHIPS

Organic	*Psychological*
Susceptibility (to trauma, infections, circulatory disturbances, biochemical disturbances and deficits, new growths, etc., etc.)	*Psychophysical Types*: Physiological, Morphological, Psychological
Somatizations: Organs of External Relationships, Organs of Internal Economy, Instinctual Organs, Body as a Whole	*Psychopathological Settings*: Psychoneuroses, Neurotic Behavior Disorders, Psychopathic Behavior Disorders, Psychoses

argument for the grouping of the psychoneuroses together into a general category of psychoneurotic constellations, nor for the differentiation between neurotic behavior disorders and psychopathic behavior disorders. Out of these relationships, however, the above general diagnostic diagram may be evolved (Figure 2).

From this diagram it should be evident that in the characterization of psychosomatic disorders, a simple terminology can hardly be adequately descriptive. Thus, a case of psychogenic impotence can be adequately characterized only by some descriptive term which will indicate also the nature of the psychopathological setting such as "an instinctual somatization in a psychosis," or in a psychopathic behavior disorder, or in a neurotic behavior disorder, a neurosis, a neurotic depression, or an anxiety neurosis. Or, when as sometimes happens, the somatic disturbance tends to alternate with some other form of psychopathology, this must be indicated by inserting the words "alternating with" between the two components of the descriptive label, e.g., "instinctual somatization *alternating with* neurotic depression." These phrases are offered merely as examples of the terminology which would grow out of this approach.

IV. CODIFICATION

An increasing number of hospitals are studying the psychosomatic

relationships of the processes of disease. Inquiries addressed to these hospitals have revealed considerable perplexity over the problem of codifying, indexing, and filing clinical data in such a way as to make the many details easily and rapidly available for research purposes.

A tentative plan of codification is therefore suggested here, growing out of the classification we have described, in order to instigate a study of the problem by those who are experienced in the relation of the classification and codification of disease to statistical analyses.

1. Suggested Addition to the Standard Classified Nomenclature of Disease: In the system of numerical codification of the Standard Classified Nomenclature of Disease, the topographical site of the disease process is indicated by numbers which precede the dash, and the nature of the etiological agent by numbers which follow it. Because the site of the disease has psychosomatic importance, both physiologically and psychologically, and also because any new system of codification should make use of existing systems, it is suggested that the same general order should be followed for the codification of psychosomatic phenomena.

Certain additions are necessary, however, in order to include psychosomatic considerations in the standard codification of disease. The psychosomatic process involves the personality as a whole, mediating its influence through the nervous system and manifesting itself either in the body or in some part of it. Although a specific area or organ may be the site of the disturbance, the disease process arises in the whole personality and not in any one organ, not even in the nervous system. Therefore, if we limited ourselves to topographical categories alone, we would indicate not the site of the disease process but merely the part of the body which is being used to express a disorder of the whole psychobiological unit. Therefore, and because of the multidimensional nature of psychosomatic considerations, we end up with an index number which may consist of as many as five units.

a. It would seem wise to introduce the psychosomatic constellation as a new sub-unit under OO "Psychobiological unit." This new unit might be called the "psychosomatic unit," and it could then be codified as follows:

OOI –Somatizations of organs of External Relationship
OOII –Somatizations of Organs of Internal Economy
OOIII–Somatizations of Instinctual Organs
OOIV–Somatizations of the Body as a Whole

b. An additional topographical indication is then needed, as in the existing code, to identify the precise organ of the body involved. This could be provided by introducing after the dash, the code numbers appropriate to the area or organ which is the site of the chief disturbing somatic symptoms.

c. As in the existing code the etiological categories would follow, but present certain difficulties. In the Standard Classified Nomenclature the accepted categories of causes are: prenatal influence (category "O"), infection (categories 1 and 2), intoxication (category 3), trauma (category 4), anemia, ischemia, thrombosis, and other such circulatory disturbances (category 5). Diseases which are secondary to "disturbances of innervation or of psychic control" fall into categories 5.5 to 5.9. Mechanical obstructions or abnormalities fall into category 6; disorders of metabolism, growth and nutrition, category 7; new growths, category 8; unknown disease processes, degenerative, inflammatory, hereditary, and familial, etc., categories 9 and 10; undiagnosed disease, category Y. It is evident that among existing categories the one which will be applicable to our problem most frequently is category 5.5, "diseases secondary to disturbances of innervation and psychic control," which includes code numbers for almost all possible motor and sensory disturbances, disturbances of sympathetic and parasympathetic innervations, and reflex disturbances. However, the psychosomatic interrelationships are significant in many other etiological processes (glandular, chemical, infectious, etc.) and their appropriate codification makes it necessary to provide a place for the inclusion of this whole section of the standard classification.

In order to introduce as little change as possible, the etiological classification could therefore be introduced after the second dash.

d. This would have to be followed by the code number for a psychopathological setting. Thus an hysterical flaccid paralysis of the upper extremity would be codified as follows: 001-080-560.

e. The final unit in the full code would indicate the presence of addictions or perversions.

2. Standard Psychiatric Classification Approved by the American Psychiatric Association: In the special section on the classification of mental disorders which has been approved by the Council of the American Psychiatric Association, the psychosomatic disorders would have

FIGURE 3

CASE SUMMARY	CODIFICATION		
Name Age Hosp. # Service	*Standard Classified Nomencl. of Disease*	*Approved Psychiatric Classification—A.P.A.*	
		Standard	*Condensed*
Medical and/or Surgical diagnosis	q. v.		
Socio-familial Diagnosis — (Economic and social level, position in family —marital status—occupation)			
Conventional Psychiatric Diagnosis (if any)		q. v.	q. v.
PSYCHOSOMATIC SUMMARY			
A. Somatizations of the			
Organs of External Relationships		00I	25I
Organs of Internal Economy		00II	25II
Instinctual Organs		00III	25III
Body as a Whole		00IV	25IV
B. Organ or Body Area Involvement (Standard Classified Nomenclature—Topographical)	q. v.		
C. Etiological and Pathophysiological Classif. (Standard Classified Nomencl.—Etiological)	q. v.		
*D. Psychopathological Setting			
General *Special*			
1. Psychoneurosis		002-x00 to 002-x33 & x0x	161-167
2. Neurotic Behavior Disorder		000-x61 000-x71-3	241-242
3. Psychopath. " "		000-x40	2361-2364
4. Psychosis		q. v.	q. v.
*E. Addictions and/or Perversions		000-332 000-3xx 000-x41	232-233 2361
Cumulative Codification		(Order: A, B, C, D, E)	

* These code numbers are from the approved psychiatric nomenclature. They are wholly unsatisfactory; but must be used until the basic classification is improved.

to be introduced as an additional category, OOI to OOIV, with the subdivisions already indicated:

OOI –Somatizations of Organs of External Relationship
OOII –Somatizations of Organs of Internal Economy
OOIII–Somatizations of Instinctual Organs
OOIV–Somatizations of the Body as a Whole

Neurasthenia and hypochondriasis would be transferred from their present position in the code to the Somatizations of the Body as a Whole. The "conversion hysterias" would be transferred to the Somatizations of Organs of External Relationship; and code numbers would be provided for the Somatizations of Organs of Internal Economy and Somatizations of Instinctual Organs, whose very existence is not recognized in the existing standard nomenclature.

3. Condensed Form: In the official condensed form of the new classification adopted by the Committee on Statistics and approved by the Council of the American Psychiatric Association, the psychosomatic disorders could be added to the existing list as follows:

25 Psychosomatic Disorders:
25I –Somatizations of Organs of External Relationship
25II –Somatizations of Organs of Internal Economy
25III–Somatizations of Instinctual Organs
25IV–Somatizations of the Body as a Whole

As in the more complete code, the hysterias, the hypochondriacal and the neurasthenic states will have to be transferred to their appropriate setting under this new classification.

Furthermore, the general psychopathological setting in which the psychosomatic disturbance occurs can be indicated readily by the appropriate code number after the dash. For instance, a Somatization of Organs of External Relationship in a psychoneurotic setting would be codified as 25I-16; in a neurotic behavior disorder as 25I-24; in a psychopathic personality as 25I-236; and in a setting of psychosis as 25I- followed by the number appropriate to the particular type of psychotic disturbance which is found to be present.

A face-sheet for summarizing psychosomatic records is appended.

Summary

Psychosomatic interrelationships indicate the processes by which energies which are generated on the psychological level of experience

can be translated into disturbances of somatic functions. The process of somatization is viewed as a series of successive stages in the dissociation of a physiological process from its original physiological purpose. The following steps are recognized: (1) Normal compensatory and synergistic physiological mechanisms are brought into play in order to reënforce action against internal or external obstacles. (2) Because this usually occurs in a setting of a consciously perceived emotion, a conditioned link is established between the emotion and these some bodily mechanisms of reënforcement and overflow, even without stressful action. (3) The physiological manifestations of reënforcement and overflow can occur alone, without either stressful action or conscious emotion. (4) The sustained influence of chronic unconscious inner tension can then overflow into one of four channels, involving: (a) Organs of External Relationship, (b) Organs of Internal Economy, (c) Instinctual Organs, (d) Diffuse Involvement of the Body as a Whole.

The clinical evaluation of any of these states of somatization depends (a) upon the type of somatization, and (b) upon the psychopathological setting in which it arises. This gives rise to a descriptive nomenclature which has clinical and prognostic implications, and (c) to a possible system of codification which can be constructed on the foundations of the Standard Classified Nomenclature of Disease.

REFERENCES

1. Kretschmer, E. *Physique and character.* New York, Harcourt, Brace & Co., 1925.
2. Draper, G. *Constitution and disease. Nelson Loose-Leaf Living Medicine,* New York, T. Nelson & Sons, 192(?) (1. ed.), v. 7, pp. 543-60.
3. Wertheimer, F. I. and Hesketh, F. E. *The significance of the physical constitution in mental disease.* Baltimore, Williams and Wilkins, 1926.
4. Sheldon, W. H, Stevens, S. S. and Tucker, W. B. *The varieties of human physique.* New York, Harper, 1940. Sheldon, W. H. *The varieties of temperament.* New York, Harper, 1942.
5. Dunbar, H. F. *Psychosomatic diagnosis.* New York, Hoeber, *in press.*
6. Pearl, R. *Constitution and health.* London, K. Paul, Trench, Trubner & Co., 1933, p. 29.

PROCEEDINGS OF ACADEMY MEETINGS

STATED MEETINGS

OCTOBER 7—*The New York Academy of Medicine.* ¶Executive session. Reading of the minutes. ¶Papers of the evening. Status of penicillin, clinical viewpoint. Chester S. Keefer, Wade Professor of Medicine; Boston University School of Medicine.

OCTOBER 28—*The Harvey Society in affiliation with The New York Academy of Medicine.* The First Harvey Lecture, "Some Observations on Pain," Harold G. Wolff, Associate Professor of Medicine, Cornell University Medical College. This lecture takes the place of the Second Stated Meeting of the Academy for October.

NOVEMBER 4—*The New York Academy of Medicine.* Executive session—a] Reading of the minutes; b] Report of Nominating Committee. ¶ Papers of the evening. ¶Present Status of the Treatment of Pneumonias—a] Treatment of lobar pneumonia, Norman Plummer, Major, M.C., A.U.S., Cornell University Medical College; b] The use of penicillin in the treatment of lobar pneumonia and pneumococcal empyema, William S. Tillett, Professor of Medicine, New York University College of Medicine. ¶ Report on election of Fellows.

NOVEMBER 18—*The Harvey Society in affiliation with The New York Academy of Medicine.* The Second Harvey Lecture, "Recent Work on the Respiratory Chemistry of the Blood," F. J. W. Roughton, F.R.S., Fellow of Trinity College, Lecturer in Physiology, Cambridge University.

This lecture takes the place of the Second Stated Meeting of the Academy for November.

SECTION MEETINGS

OCTOBER 1—*Section of Surgery.* ¶ Reading of the minutes. ¶ Papers of the evening—a] The importance of missile velocity in the production of wounds, George R. Callender, Col., M.C., USA Director of Army Medical School, Washington, D. C. (by invitation); b] Battle casualties as seen at the Halloran General Hospital, George K. Carpenter, Maj., M.C., AUS (by invitation); c] Blast injuries in naval warfare, Rupert H. Draeger, Comdr. (M.C.), USN, Naval Medical Research Institute, Bethesda, Maryland (by invitation). ¶ General discussion. ¶ Executive session.

The following Sections canceled their regular meetings October 11 to 22 in favor of the Graduate Fortnight: Neurology & Psychiatry, Pediatrics, Ophthalmology, Genito-Urinary Surgery, Orthopedic Surgery, Medicine, Otolaryngology.

OCTOBER 26—*Section of Obstetrics and Gynecology.* Executive session. ¶ Reading of minutes. ¶ Case reports.—a] Efficacy of penicillin after failure of sulfa drugs in bloodstream infection following vaginal plastic operation. Alfred M. Hellman, E. Fluth Guilfoil (by invitation) b] Artificial insemination aided by vaginal diaphragm, Borris A. Kornblith. ¶ Papers of the evening—a] The mechanism of transplacental isoimmunization by the Rh factor (Also a brief review of work done to date on the Rh factor), Philip Levine; b] Vulvovaginitis in children, Rose H. Andre (by invitation). ¶ General discussion, I. Rubin, Harry Green (by invitation).

NOVEMBER 3—*Section of Dermatology and Syphilology.* Presentation of cases—a] From the Skin and Cancer Unit, New York Post-Graduate Medical School

and Hospital; b] Miscellaneous cases. ¶ General discussion. ¶ Reading of the minutes. ¶ Executive session.

NOVEMBER 5—*Section of Surgery.* Reading of the minutes. ¶ Presentation of cases —a] Cases of spine fracture from the Knickerbocker Hospital, Philip D. Allen; b] Cases of shoulder "cuff" injury from St. Luke's Hospital, Frederick R. Thompson. ¶ Papers of the evening—a] Some new conceptions of the differential diagnosis and treatment of shoulder "cuff" injuries, Harrison L. McLaughlin; b] Essentials in the treatment of fractures and dislocations of the spine, Arthur G. Davis, Erie, Pennsylvania (by invitation). ¶ General discussion. ¶ Executive session.

NOVEMBER 9—*Combined Meeting of the New York Neurological Society and the Section of Neurology and Psychiatry.* ¶ Presidential address. The nature of psychogenic cure, C. P. Oberndorf. ¶ Papers of the evening—a] Integration of the electroencephalogram—An approach to schizophrenia through electroencephalography, Charles S. Roberts, M.A. (by invitation); William J. Turner (by invitation); b] Physiological and clinical aspects of the electroencephalogram, Tracy J. Putnam, Paul F. A. Hoefer. ¶ Discussion—Bernard L. Pacella.

NOVEMBER 10—*Section of Historical and Cultural Medicine.* ¶ Reading of the minutes. ¶ Paper of the evening. The history of aviation medicine, Victor Robinson. ¶ Discussion—Robert John Hunter, Lt. Commander, (MC) USN (Ret.) (by invitation), Louis Hopewell Bauer (by invitation), and Beeckman J. Delatour.

NOVEMBER 11—*Section of Pediatrics.* ¶ Reading the minutes. ¶ Presentation of cases. ¶ Papers of the evening—a] Vitamin D in human milk, Benjamin F. Kramer, L. Polskin, Ph. D. (by invitation), A. S. Sobel (by invitation). ¶ Discussion—J. M. Lewis; b] A study of the regulation of the level of vitamin A in the blood of newborn infants, J. M. Lewis, O. Bodansky (by invitation), L. M. Shapiro (by invitation). ¶ Discussion—Samuel Z. Levine; c] Niacin deficiency in children, Harry Bakwin, James Winn (by invitation), Margaret Tenbrinck (by invitation); ¶ Discussion—H. D. Kruse (by invitation). ¶ General Discussion.

NOVEMBER 15—*Ophthalmology.* ¶ Instruction Hour 7:00 o'clock; Fundus lesions, Ralph I. Lloyd. ¶ Reading of the Minutes 8:15 o'clock; ¶ Case Reports—a] Spielmeyer-Vogt's disease—a study of its pathology, Isadore Givner, Leon Roizin (by invitation); b] Monocular exophthalmos due to hyperthyroidism in a patient with Duane's syndrome, W. Guernsey Frey; ¶ Papers of the Evening—a] Fundus changes in the various forms of arterial hypertension, Herman Elwyn; ¶ Discussion—Herman O. Mosenthal; b] The ocular fundus in urological disease associated with systemic hypertension, Martin Cohen. ¶ Discussion—Arthur M. Fishberg; c] Ocular pathology in experimental hypertension, Irving Graef, Robert K. Lambert.

NOVEMBER 16—*Medicine and The New York Associated Allergy Clinics.* ¶ Papers of the Evening—a] Management of the asthmatic patient, Will C. Spain, *New York Post-Graduate Hospital;* b] Eczema, Robert A. Cooke, *Roosevelt Hospital;* c] Newer conceptions of hay fever immunization, Mary H. Loveless, *New York Hospital.* ¶ Round Table Discussion—Robert A. Cooke, *Chairman,* Robert Chobot, A. Benson Cannon, Matthew Walzer.

NOVEMBER 17—*Genito-Urinary Surgery.* ¶ Reading of the minutes. ¶ Paper of the Evening—Management of postoperative urinary tract complications, Earl E. Ewert, Lahey Clinic, Boston (by invitation). ¶ General Discussion—Clar-

ence G. Bandler, R .B. Henline. ¶ Executive session.

NOVEMBER 17—*Otolaryngology.* ¶ Reading of the Minutes. ¶ Papers of the Evening—a] Experimental investigation of cigarette smoke and its effects, Arthur W. Proetz, Professor of Clinical Otolaryngology, Washington University School of Medicine, Saint Louis, Missouri (by invitation); b] The use of sulfa drugs in the mastoidectomy wound where complete closure is employed, Arthur J. Herzig; c] 1—Unusual case of osteoma of the nasal accessory sinuses; 2—Moving picture; Radical fronto-ethmoidal operation, James Swift Hanley. ¶ Discussion—Wesley C. Bowers, John D. Kernan, Irving Schwartz.

NOVEMBER 19—*Orthopedic Surgery.* ¶ Reading of the Minutes. ¶ Presentation of Case—*From the New York Orthopedic Dispensary and Hospital*—Osteodystrophia fibrosa associated with pigmentation of skin, Paul J. Strassburger (by invitation). ¶ Papers of the evening—a] Rehabilitation of war wounded, T. Campbell Thompson, Lt. Colonel, M. C.; b] Practical application of physical therapy in rehabilitation, William Benham Snow (by invitation). ¶ General Discussion—Opened by Kristian G. Hansson. ¶ Executive Session.

NOVEMBER 23—*Obstetrics and Gynecology.* ¶ Executive Session—Reading of the minutes. ¶ Case reports—a] Efficacy of penicillin after failure of the sulfa drug in case of pregnancy complicated by gonorrhea, Hyman Strauss (by invitation). NOTE: *The main points about this new and apparently spectacular drug, penicillin, will be crystallized and illustrated with slides.* ¶ Paper of the evening—Vulvo-vaginitis in children, Rose H. Andre (by invitation). ¶ General discussion.

AFFILIATED SOCIETIES

New York Roentgen Society (in affiliation with The New York Academy of Medicine—Because of conflict in dates with the Graduate Fortnight, this Society held no meeting in October.

OCTOBER 28—*The New York Pathological Society (in affiliation with The New York Academy of Medicine).* ¶ Presentation of cases—a] Extragenital chorioepithelioma: its relation to teratoid vestiges in the testes, Antonio Rottino and Hannibal De Bellis (by invitation); b] Non-suppurative nodular panniculitis, David M. Spain (by invitation) and Joseph M. Foley (by invitation). ¶ Papers of the evening—a] Myasthenia gravis: discussion of possible underlying mechanism, Herbert C. Stoerk; b] Changes in the testes in hepatic insufficiency, Thomas C. Morrione (by invitation). ¶ Executive session.

NOVEMBER 15—*New York Roentgen Society.* ¶ Papers of the evening—*Program from Roosevelt Hospital;* a] Pulmonary emphysema, Walter W. Brandes (by invitation; b] Pulmonary infarction, Arthur Antenucci (by invitation); c] The role of the sulphonamides in the treatment of ulcerative colitis, Moore A. Mills (by invitation); d] Some manifestations of gastrointestinal allergy, William H. Boone. ¶ Executive session.

NOVEMBER 18—*The New York Pathological* Society. ¶ Presentation of cases—a] Sacrococcygeal chordoma with metastases, Lotte Graf (by invitation); b] Cystomyoma of seminal vesicle, arising from Müllerian remnants, Alfred Plaut. ¶ Papers of the evening—a] Traumatic intracerebral and intrapontine hemorrhage without skull fracture, Alfred Angrist; b] Subdural suppuration originating from purulent leptomeningitis, Eugene D. Spitz (by invitation), Ann Pollak (by invitation). ¶ Executive session.

RECENT ACCESSIONS TO THE LIBRARY

"Possession does not imply approval"

Bailey, H. & Love, R. J. M. *A short practice of surgery.* 6 ed. London, Lewis, 1943, 1033 p.

Bert, P. *Barometric pressure; researches in experimental physiology.* Columbus, O., College Book Co., 1943, 1055 p.

Everett, M. R. *Medical biochemistry.* N. Y., Hoeber, [1942], 694 p.

Friedman, R. *Biology of Acarus scabiei.* N. Y., Froben, 1942, 183 p.

Gradwohl, R. B. H. *Clinical laboratory methods and diagnosis.* 3 ed. St. Louis, Mosby, 1943, 2 v.

Kolmer, J. A. *Clinical diagnosis by laboratory examinations.* N. Y., Appleton-Century, [1943], 1239 p.

Manheim, S. D. *Proctology.* N. Y., Oxford Univ. Press, [1943], 137 p.

Ogilvie, R. F. *Pathological histology.* 2 ed. Edinburgh, Livingstone, 1943, 411 p.

Preston, F. E. *The ophthalmic prescriber's codex.* London, Lewis, 1943, 176 p.

Samuels, S. S. *Peripheral vascular diseases.* N. Y., Oxford Univ. Press, [1943], 84 p.

Textbook (A) of medicine by American authors, edited by R. L. Cecil. 6 ed. Phil., Saunders, 1943, 1566 p.

Walshe, F. M. R. *Diseases of the nervous system.* 3 ed. Edinburgh, Livingstone, 1943, 350 p.

Williams, A. E. *Barnardo of Stepney.* London, Allen, [1943], 236 p.

Wolf, S. G. & Wolff, H. G. *Human gastric function.* N. Y., Oxford Univ. Press, [1943], 195 p.

DEATHS OF FELLOWS

BELL, GEORGE HUSTON: 30 East 40 Street, New York City; born in Mt. Sydney, Virginia, August 10, 1866; died in New York City, October 5, 1943; graduated in medicine from the University of Virginia Department of Medicine in 1897; elected a Fellow of the Academy March 3, 1904.

Dr. Bell was consultant ophthalmic surgeon to the New York Eye and Ear Infirmary; eye consultant to the U. S. Public Health Service, U. S. Marine Hospital No. 70; a diplomate of the American Board of Ophthalmology, a Fellow of the American College of Surgeons, a Fellow of the American Medical Association, and a member of the American Ophthalmological Society and the State and County Medical Societies.

BUERGER, LEO: 530 Park Avenue, New York City; born in Vienna, Austria, September 13, 1879; died in New York City, October 6, 1943; graduated in medicine from the College of Physicians and Surgeons, Columbia University, in 1901; elected a Fellow of the Academy February 4, 1909.

Dr. Buerger was formerly professor of surgery (urology) at the College of Medical Evangelists, Loma Linda and Los Angeles; for many years on the staff of Mount Sinai Hospital; attending surgeon to the Beth David and Bronx Hospitals; consultant in the genito-urinary department at Israel Zion Hospital and attending urologist to the Wyckoff Heights Hospital. He was a Fellow of the American College of Surgeons, a Fellow of the American Medical Association, a member of the American Urological Association, the American Association of Pathologists and Bacteriologists and the California Medical Association. He was a contributor to various medical journals; the author of "Circulatory Disturb-

ances of the Extremities"; the discoverer of Buerger's disease; assisted in the development of the Brown-Buerger cystoscope; devised an operating cystoscope, the cystourethroscope, and other urologic instruments.

ELLIS, ZENAS HORACE: 58 East 65 Street, New York City; born in Poultney, Vermont, February 14, 1896; died in New York City, October 20, 1943; graduated in medicine from the University of Vermont in 1920; elected a Fellow of the Academy November 4, 1937. He was a diplomate of the American Board of Ophthalmology, a Fellow of the American Medical Association, a member of the American Academy of Ophthalmology and Otolaryngology, and a member of the State and County Medical Societies.

LOHMAN, WILLIAM HENRY: 431 Washington Avenue, Brooklyn, New York; born in West Orange, New Jersey, May 9, 1881; died in Brooklyn, August 8, 1943; graduated in medicine from the College of Physicians and Surgeons, Columbia University, in 1904; elected a Fellow of the Academy March 3, 1927; and served the Academy as a member of the Committee on Public Health Relations, 1937 through 1939.

Dr. Lohman was professor of clinical medicine at the Long Island College of Medicine; chief attending physician to the Brooklyn Hospital, consulting physician to the North Country Community Hospital, Glen Cove, and St. John's Hospital; a diplomate of the American Board of Internal Medicine, a Fellow of the American Medical Association and a member of the State and County Medical Societies.

During the World War, Dr. Lohman was chief of the medical service of Navy Base Hospital Number One, Brest, France, and was cited by the Navy Department for his services.

THOMEN, AUGUST STEPHEN ASTOR: 667 Madison Avenue, New York City; born in New York City, January 16, 1892; died in New York City, September 11, 1943; graduated in medicine from University and Bellevue Hospital Medical College in 1918; elected a Fellow of the Academy January 6, 1927.

Dr. Thomen was at one time attending physician to the allergy clinic of the New York Hospital, and from 1927 to 1935 director of the allergy clinic of the College of Medicine, New York University. He was a Fellow of the American Medical Association and a member of the State and County Medical Societies.

VON WEDEL, HASSOW OTTO: Ardsley-on-Hudson, New York; born at Dobbs Ferry, New York, November 18, 1886; died at Ardsley-on-Hudson, October 10, 1943; graduated in medicine from New York University College of Medicine in 1920; elected an Associate Fellow of the Academy April 19, 1928. He was a Fellow of the American Medical Association and a member of the State and County Medical Societies.

WILE, IRA SOLOMON: 264 West 73 Street, New York City; born in Rochester, New York, November 29, 1877; died in New York City, October 9, 1943; graduated in medicine from the University of Pennsylvania Department of Medicine in 1902; elected a Fellow of the Academy January 9, 1927.

Dr. Wile was associate pediatrician at The Mount Sinai Hospital, a diplomate of the American Board of Psychiatry and Neurology, a member of the Board of Education, 1912-1918, a member and President in 1932 of the American Orthopsychiatric Association, a member of the American Psychiatric Association, the American Public Health Association, the American Speech Correction Association, the National Committee for Mental Hygiene, the International Committee for Mental Hygiene, the Society for the Advancement of Education, the American Child Health Association, the Medical Societies of the State and County, and a Fellow of the American Medical Association. He was the author of numerous books, a contributor to many medical publications and lecturer in educational hygiene at New York University and Columbia University.